

SEQUENCE LISTING

<110> Matti Sallberg
Catharina Hultgren

<120> VACCINES CONTAINING RIBAVIRIN AND
METHODS OF USE THEREOF

<130> TRIPEP.23AUS2

<150> 09/705,547

<151> 2000-11-03

<150> 60/229,175

<151> 2000-08-29

<150> 60/225,767

<151> 2000-08-17

<160> 49

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 3011

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus sequence

<400> 1

| | | | | | | | | | | | | | | | |
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| Met | Ser | Thr | Asn | Pro | Lys | Pro | Gln | Arg | Lys | Thr | Lys | Arg | Asn | Thr | Asn |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Arg | Arg | Pro | Gln | Asp | Val | Lys | Phe | Pro | Gly | Gly | Gly | Gln | Ile | Val | Gly |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Gly | Val | Tyr | Leu | Leu | Pro | Arg | Arg | Gly | Pro | Arg | Leu | Gly | Val | Arg | Ala |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Thr | Arg | Lys | Thr | Ser | Glu | Arg | Ser | Gln | Pro | Arg | Gly | Arg | Arg | Gln | Pro |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Ile | Pro | Lys | Ala | Arg | Arg | Pro | Glu | Gly | Arg | Thr | Trp | Ala | Gln | Pro | Gly |
| 65 | | | | 70 | | | | | 75 | | | | | 80 | |
| Tyr | Pro | Trp | Pro | Leu | Tyr | Gly | Asn | Glu | Gly | Cys | Gly | Trp | Ala | Gly | Trp |
| | | | 85 | | | | | 90 | | | | | 95 | | |
| Leu | Leu | Ser | Pro | Arg | Gly | Ser | Arg | Pro | Ser | Trp | Gly | Pro | Thr | Asp | Pro |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Arg | Arg | Arg | Ser | Arg | Asn | Leu | Gly | Lys | Val | Ile | Asp | Thr | Leu | Thr | Cys |
| | | 115 | | | | 120 | | | | | 125 | | | | |
| Gly | Phe | Ala | Asp | Leu | Met | Gly | Tyr | Ile | Pro | Leu | Val | Gly | Ala | Pro | Leu |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Gly | Gly | Ala | Ala | Arg | Ala | Leu | Ala | His | Gly | Val | Arg | Val | Leu | Glu | Asp |
| 145 | | | | 150 | | | | | 155 | | | | | 160 | |
| Gly | Val | Asn | Tyr | Ala | Thr | Gly | Asn | Leu | Pro | Gly | Cys | Ser | Phe | Ser | Ile |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Phe | Leu | Leu | Ala | Leu | Leu | Ser | Cys | Leu | Thr | Val | Pro | Ala | Ser | Ala | Tyr |
| Gln | Val | Arg | Asn | Ser | Ser | Gly | Leu | Tyr | His | Val | Thr | Asn | Asp | Cys | Pro |
| Asn | Ser | Ser | Val | Val | Tyr | Glu | Ala | Ala | Asp | Ala | Ile | Leu | His | Thr | Pro |
| Gly | Cys | Val | Pro | Cys | Val | Arg | Glu | Gly | Asn | Ala | Ser | Arg | Cys | Trp | Val |
| Ala | Val | Thr | Pro | Thr | Val | Ala | Thr | Arg | Asp | Gly | Lys | Leu | Pro | Thr | Thr |
| Gln | Leu | Arg | Arg | His | Ile | Asp | Leu | Leu | Val | Gly | Ser | Ala | Thr | Leu | Cys |
| Ser | Ala | Leu | Tyr | Val | Gly | Asp | Leu | Cys | Gly | Ser | Val | Phe | Leu | Val | Gly |
| Gln | Leu | Phe | Thr | Phe | Ser | Pro | Arg | His | His | Trp | Thr | Thr | Gln | Asp | Cys |
| Asn | Cys | Ser | Ile | Tyr | Pro | Gly | His | Ile | Thr | Gly | His | Arg | Met | Ala | Trp |
| Asn | Met | Met | Met | Asn | Trp | Ser | Pro | Thr | Ala | Ala | Leu | Val | Val | Ala | Gln |
| Leu | Leu | Arg | Ile | Pro | Gln | Ala | Ile | Met | Asp | Met | Ile | Ala | Gly | Ala | His |
| Trp | Gly | Val | Leu | Ala | Gly | Ile | Lys | Tyr | Phe | Ser | Met | Val | Gly | Asn | Trp |
| Ala | Lys | Val | Leu | Val | Val | Leu | Leu | Leu | Phe | Ala | Gly | Val | Asp | Ala | Glu |
| Thr | His | Val | Thr | Gly | Gly | Asn | Ala | Gly | Arg | Thr | Thr | Ala | Gly | Leu | Val |
| Gly | Leu | Leu | Thr | Pro | Gly | Ala | Lys | Gln | Asn | Ile | Gln | Leu | Ile | Asn | Thr |
| Asn | Gly | Ser | Trp | His | Ile | Asn | Ser | Thr | Ala | Leu | Asn | Cys | Asn | Glu | Ser |
| Leu | Asn | Thr | Gly | Trp | Leu | Ala | Gly | Leu | Phe | Tyr | Gln | His | Lys | Phe | Asn |
| Ser | Ser | Gly | Cys | Pro | Glu | Arg | Leu | Ala | Ser | Cys | Arg | Arg | Leu | Thr | Asp |
| Phe | Ala | Gln | Gly | Trp | Gly | Pro | Ile | Ser | Tyr | Ala | Asn | Gly | Ser | Gly | Leu |
| Asp | Glu | Arg | Pro | Tyr | Cys | Trp | His | Tyr | Pro | Pro | Arg | Pro | Cys | Gly | Ile |
| Val | Pro | Ala | Lys | Ser | Val | Cys | Gly | Pro | Val | Tyr | Cys | Phe | Thr | Pro | Ser |
| Pro | Val | Val | Val | Gly | Thr | Thr | Asp | Arg | Ser | Gly | Ala | Pro | Thr | Tyr | Ser |
| Trp | Gly | Ala | Asn | Asp | Thr | Asp | Val | Phe | Val | Leu | Asn | Asn | Thr | Arg | Pro |
| Pro | Leu | Gly | Asn | Trp | Phe | Gly | Cys | Thr | Trp | Met | Asn | Ser | Thr | Gly | Phe |
| Thr | Lys | Val | Cys | Gly | Ala | Pro | Pro | Cys | Val | Ile | Gly | Gly | Val | Gly | Asn |
| Asn | Thr | Leu | Leu | Cys | Pro | Thr | Asp | Cys | Phe | Arg | Lys | Tyr | Pro | Glu | Ala |
| Thr | Tyr | Ser | Arg | Cys | Gly | Ser | Gly | Pro | Arg | Ile | Thr | Pro | Arg | Cys | Met |

| | | | | | | | | | | 1045 | | | 1050 | | | 1055 | | | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------|------|-----|------|------|--|--|
| Gly | Glu | Val | Gln | Ile | Val | Ser | Thr | Ala | Thr | Gln | Thr | Phe | Leu | Ala | Thr | | | | |
| | | | | | | | | | | 1060 | | | 1065 | | | 1070 | | | |
| Cys | Ile | Asn | Gly | Val | Cys | Trp | Thr | Val | Tyr | His | Gly | Ala | Gly | Thr | Arg | | | | |
| | | | | | | | | | | 1075 | | | 1080 | | | 1085 | | | |
| Thr | Ile | Ala | Ser | Pro | Lys | Gly | Pro | Val | Ile | Gln | Thr | Tyr | Thr | Asn | Val | | | | |
| | | | | | | | | | | 1090 | | | 1095 | | | 1100 | | | |
| Asp | Gln | Asp | Leu | Val | Gly | Trp | Pro | Ala | Pro | Gln | Gly | Ser | Arg | Ser | Leu | | | | |
| 1105 | | | | | | | | | | | 1110 | | | 1115 | | | 1120 | | |
| Thr | Pro | Cys | Thr | Cys | Gly | Ser | Ser | Asp | Leu | Tyr | Leu | Val | Thr | Arg | His | | | | |
| | | | | | | | | | | 1125 | | | 1130 | | | 1135 | | | |
| Ala | Asp | Val | Ile | Pro | Val | Arg | Arg | Arg | Gly | Asp | Ser | Arg | Gly | Ser | Leu | | | | |
| | | | | | | | | | | 1140 | | | 1145 | | | 1150 | | | |
| Leu | Ser | Pro | Arg | Pro | Ile | Ser | Tyr | Leu | Lys | Gly | Ser | Ser | Gly | Gly | Pro | | | | |
| | | | | | | | | | | 1155 | | | 1160 | | | 1165 | | | |
| Leu | Leu | Cys | Pro | Thr | Gly | His | Ala | Val | Gly | Leu | Phe | Arg | Ala | Ala | Val | | | | |
| | | | | | | | | | | 1170 | | | 1175 | | | 1180 | | | |
| Cys | Thr | Arg | Gly | Val | Ala | Lys | Ala | Val | Asp | Phe | Ile | Pro | Val | Glu | Asn | | | | |
| 1185 | | | | | | | | | | | 1190 | | | 1195 | | | 1200 | | |
| Leu | Glu | Thr | Thr | Met | Arg | Ser | Pro | Val | Phe | Thr | Asp | Asn | Ser | Ser | Pro | | | | |
| | | | | | | | | | | 1205 | | | 1210 | | | 1215 | | | |
| Pro | Ala | Val | Pro | Gln | Ser | Phe | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | | | | |
| | | | | | | | | | | 1220 | | | 1225 | | | 1230 | | | |
| Gly | Ser | Gly | Lys | Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Lys | Gly | | | | |
| | | | | | | | | | | 1235 | | | 1240 | | | 1245 | | | |
| Tyr | Lys | Val | Leu | Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Leu | Gly | Phe | | | | |
| | | | | | | | | | | 1250 | | | 1255 | | | 1260 | | | |
| Gly | Ala | Tyr | Met | Ser | Lys | Ala | His | Gly | Val | Asp | Pro | Asn | Ile | Arg | Thr | | | | |
| 1265 | | | | | | | | | | | 1270 | | | 1275 | | | 1280 | | |
| Gly | Val | Arg | Thr | Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | | | | |
| | | | | | | | | | | 1285 | | | 1290 | | | 1295 | | | |
| Gly | Lys | Phe | Leu | Ala | Asp | Ala | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | | | | |
| | | | | | | | | | | 1300 | | | 1305 | | | 1310 | | | |
| Ile | Ile | Cys | Asp | Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Ser | Gly | | | | |
| | | | | | | | | | | 1315 | | | 1320 | | | 1325 | | | |
| Ile | Gly | Thr | Val | Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Val | | | | |
| | | | | | | | | | | 1330 | | | 1335 | | | 1340 | | | |
| Val | Leu | Ala | Thr | Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Ser | His | Pro | | | | |
| 1345 | | | | | | | | | | | 1350 | | | 1355 | | | 1360 | | |
| Asn | Ile | Glu | Glu | Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | | | | |
| | | | | | | | | | | 1365 | | | 1370 | | | 1375 | | | |
| Gly | Lys | Ala | Ile | Pro | Leu | Glu | Val | Ile | Lys | Gly | Gly | Arg | His | Leu | Ile | | | | |
| | | | | | | | | | | 1380 | | | 1385 | | | 1390 | | | |
| Phe | Cys | His | Ser | Lys | Lys | Lys | Cys | Asp | Glu | Leu | Ala | Ala | Lys | Leu | Val | | | | |
| | | | | | | | | | | 1395 | | | 1400 | | | 1405 | | | |
| Ala | Leu | Gly | Ile | Asn | Ala | Val | Ala | Tyr | Tyr | Arg | Gly | Leu | Asp | Val | | | | | |

| | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| Ser | Glu | Pro | Ala | Pro | Ser | Gly | Cys | Pro | Pro | Asp | Ser | Asp | Val | Glu | Ser | 2370 | 2375 | 2380 |
| Tyr | Ser | Ser | Met | Pro | Pro | Leu | Glu | Gly | Glu | Pro | Gly | Asp | Pro | Asp | Leu | 2385 | 2390 | 2395 |
| Ser | Asp | Gly | Ser | Trp | Ser | Thr | Val | Ser | Ser | Gly | Ala | Asp | Thr | Glu | Asp | 2405 | 2410 | 2415 |
| Val | Val | Cys | Cys | Ser | Met | Ser | Tyr | Ser | Trp | Thr | Gly | Ala | Leu | Val | Thr | 2420 | 2425 | 2430 |
| Pro | Cys | Ala | Ala | Glu | Glu | Gln | Lys | Leu | Pro | Ile | Asn | Ala | Leu | Ser | Asn | 2435 | 2440 | 2445 |
| Ser | Leu | Leu | Arg | His | His | Asn | Leu | Val | Tyr | Ser | Thr | Thr | Ser | Arg | Ser | 2450 | 2455 | 2460 |
| Ala | Cys | Gln | Arg | Lys | Lys | Lys | Val | Thr | Phe | Asp | Arg | Leu | Gln | Val | Leu | 2465 | 2470 | 2475 |
| Asp | Ser | His | Tyr | Gln | Asp | Val | Leu | Lys | Glu | Val | Lys | Ala | Ala | Ala | Ser | 2485 | 2490 | 2495 |
| Lys | Val | Lys | Ala | Asn | Leu | Leu | Ser | Val | Glu | Glu | Ala | Cys | Ser | Leu | Ala | 2500 | 2505 | 2510 |
| Pro | Pro | His | Ser | Ala | Lys | Ser | Lys | Phe | Gly | Tyr | Gly | Ala | Lys | Asp | Val | 2515 | 2520 | 2525 |
| Arg | Cys | His | Ala | Arg | Lys | Ala | Val | Ala | His | Ile | Asn | Ser | Val | Trp | Lys | 2530 | 2535 | 2540 |
| Asp | Leu | Leu | Glu | Asp | Ser | Val | Thr | Pro | Ile | Asp | Thr | Thr | Ile | Met | Ala | 2545 | 2550 | 2555 |
| Lys | Asn | Glu | Val | Phe | Cys | Val | Gln | Pro | Glu | Lys | Gly | Gly | Arg | Lys | Pro | 2565 | 2570 | 2575 |
| Ala | Arg | Leu | Ile | Val | Phe | Pro | Asp | Leu | Gly | Val | Arg | Val | Cys | Glu | Lys | 2580 | 2585 | 2590 |
| Met | Ala | Leu | Tyr | Asp | Val | Val | Ser | Lys | Leu | Pro | Leu | Ala | Val | Met | Gly | 2595 | 2600 | 2605 |
| Ser | Ser | Tyr | Gly | Phe | Gln | Tyr | Ser | Pro | Gly | Gln | Arg | Val | Glu | Phe | Leu | 2610 | 2615 | 2620 |
| Val | Gln | Ala | Trp | Lys | Ser | Lys | Lys | Thr | Pro | Met | Gly | Leu | Ser | Tyr | Asp | 2625 | 2630 | 2635 |
| Thr | Arg | Cys | Phe | Asp | Ser | Thr | Val | Thr | Glu | Ser | Asp | Ile | Arg | Thr | Glu | 2645 | 2650 | 2655 |
| Glu | Ala | Ile | Tyr | Gln | Cys | Cys | Asp | Leu | Asp | Pro | Gln | Ala | Arg | Val | Ala | 2660 | 2665 | 2670 |
| Ile | Lys | Ser | Leu | Thr | Glu | Arg | Leu | Tyr | Val | Gly | Gly | Pro | Leu | Thr | Asn | 2675 | 2680 | 2685 |
| Ser | Arg | Gly | Glu | Asn | Cys | Gly | Tyr | Arg | Arg | Cys | Arg | Ala | Ser | Arg | Val | 2690 | 2695 | 2700 |
| Leu | Thr | Thr | Ser | Cys | Gly | Asn | Thr | Leu | Thr | Arg | Tyr | Ile | Lys | Ala | Arg | 2705 | 2710 | 2715 |
| Ala | Ala | Cys | Arg | Ala | Ala | Gly | Leu | Gln | Asp | Cys | Thr | Met | Leu | Val | Cys | 2725 | 2730 | 2735 |
| Gly | Asp | Asp | Leu | Val | Val | Ile | Cys | Glu | Ser | Ala | Gly | Val | Gln | Glu | Asp | 2740 | 2745 | 2750 |
| Ala | Ala | Ser | Leu | Arg | Ala | Phe | Thr | Glu | Ala | Met | Thr | Arg | Tyr | Ser | Ala | 2755 | 2760 | 2765 |
| Pro | Pro | Gly | Asp | Pro | Pro | Gln | Pro | Glu | Tyr | Asp | Leu | Glu | Leu | Ile | Thr | 2770 | 2775 | 2780 |
| Ser | Cys | Ser | Ser | Asn | Val | Ser | Val | Ala | His | Asp | Gly | Ala | Gly | Lys | Arg | 2785 | 2790 | 2795 |
| Val | Tyr | Tyr | Leu | Thr | Arg | Asp | Pro | Thr | Thr | Pro | Leu | Ala | Arg | Ala | Ala | | | |

| | | | | | |
|---|-----|-----|-----|-----|-----|
| 130 | | 135 | | 140 | |
| Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp | | | | | |
| 145 | | 150 | | 155 | 160 |
| Gly Val Asn Tyr Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile | | | | | |
| | 165 | | 170 | | 175 |
| Phe Leu Leu Ala Leu Leu | | | | | |
| 180 | | | | | |

<210> 3
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 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Hepatitis C virus E1 protein sequence

| | |
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| Gly Leu Tyr His Val Thr Asn Asp Cys Pro Asn Ser Ser Val Val Tyr | |
| | 20 25 30 |
| Glu Ala Ala Asp Ala Ile Leu His Thr Pro Gly Cys Val Pro Cys Val | |
| | 35 40 45 |
| Arg Glu Gly Asn Ala Ser Arg Cys Trp Val Ala Val Thr Pro Thr Val | |
| | 50 55 60 |
| Ala Thr Arg Asp Gly Lys Leu Pro Thr Thr Gln Leu Arg Arg His Ile | |
| 65 | 70 75 80 |
| Asp Leu Leu Val Gly Ser Ala Thr Leu Cys Ser Ala Leu Tyr Val Gly | |
| | 85 90 95 |
| Asp Leu Cys Gly Ser Val Phe Leu Val Gly Gln Leu Phe Thr Phe Ser | |
| | 100 105 110 |
| Pro Arg His His Trp Thr Thr Gln Asp Cys Asn Cys Ser Ile Tyr Pro | |
| | 115 120 125 |
| Gly His Ile Thr Gly His Arg Met Ala Trp Asn Met Met Asn Trp | |
| | 130 135 140 |
| Ser Pro Thr Ala Ala Leu Val Val Ala Gln Leu Leu Arg Ile Pro Gln | |
| 145 | 150 155 160 |
| Ala Ile Met Asp Met Ile Ala Gly Ala His Trp Gly Val Leu Ala Gly | |
| | 165 170 175 |
| Ile Lys Tyr Phe Ser Met Val Gly Asn Trp Ala Lys Val Leu Val Val | |
| | 180 185 190 |
| Leu Leu Leu Phe Ala | |
| 195 | |

<210> 4
 <211> 350
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Hepatitis C virus E2 protein sequence

<400> 4

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Val | Asp | Ala | Glu | Thr | His | Val | Thr | Gly | Gly | Asn | Ala | Gly | Arg | Thr | 1 | 5 | 10 | 15 |
| Thr | Ala | Gly | Leu | Val | Gly | Leu | Leu | Thr | Pro | Gly | Ala | Lys | Gln | Asn | Ile | 20 | 25 | 30 | |
| Gln | Leu | Ile | Asn | Thr | Asn | Gly | Ser | Trp | His | Ile | Asn | Ser | Thr | Ala | Leu | 35 | 40 | 45 | |
| Asn | Cys | Asn | Glu | Ser | Leu | Asn | Thr | Gly | Trp | Leu | Ala | Gly | Leu | Phe | Tyr | 50 | 55 | 60 | |
| Gln | His | Lys | Phe | Asn | Ser | Ser | Gly | Cys | Pro | Glu | Arg | Leu | Ala | Ser | Cys | 65 | 70 | 75 | 80 |
| Arg | Arg | Leu | Thr | Asp | Phe | Ala | Gln | Gly | Trp | Gly | Pro | Ile | Ser | Tyr | Ala | 85 | 90 | 95 | |
| Asn | Gly | Ser | Gly | Leu | Asp | Glu | Arg | Pro | Tyr | Cys | Trp | His | Tyr | Pro | Pro | 100 | 105 | 110 | |
| Arg | Pro | Cys | Gly | Ile | Val | Pro | Ala | Lys | Ser | Val | Cys | Gly | Pro | Val | Tyr | 115 | 120 | 125 | |
| Cys | Phe | Thr | Pro | Ser | Pro | Val | Val | Val | Gly | Thr | Thr | Asp | Arg | Ser | Gly | 130 | 135 | 140 | |
| Ala | Pro | Thr | Tyr | Ser | Trp | Gly | Ala | Asn | Asp | Thr | Asp | Val | Phe | Val | Leu | 145 | 150 | 155 | 160 |
| Asn | Asn | Thr | Arg | Pro | Pro | Leu | Gly | Asn | Trp | Phe | Gly | Cys | Thr | Trp | Met | 165 | 170 | 175 | |
| Asn | Ser | Thr | Gly | Phe | Thr | Lys | Val | Cys | Gly | Ala | Pro | Pro | Cys | Val | Ile | 180 | 185 | 190 | |
| Gly | Gly | Val | Gly | Asn | Asn | Thr | Leu | Leu | Cys | Pro | Thr | Asp | Cys | Phe | Arg | 195 | 200 | 205 | |
| Lys | Tyr | Pro | Glu | Ala | Thr | Tyr | Ser | Arg | Cys | Gly | Ser | Gly | Pro | Arg | Ile | 210 | 215 | 220 | |
| Thr | Pro | Arg | Cys | Met | Val | Asp | Tyr | Pro | Tyr | Arg | Leu | Trp | His | Tyr | Pro | 225 | 230 | 235 | 240 |
| Cys | Thr | Ile | Asn | Tyr | Thr | Ile | Phe | Lys | Val | Arg | Met | Tyr | Val | Gly | Gly | 245 | 250 | 255 | |
| Val | Glu | His | Arg | Leu | Glu | Ala | Ala | Cys | Asn | Trp | Thr | Arg | Gly | Glu | Arg | 260 | 265 | 270 | |
| Cys | Asp | Leu | Glu | Asp | Arg | Asp | Arg | Ser | Glu | Leu | Ser | Pro | Leu | Leu | Leu | 275 | 280 | 285 | |
| Ser | Thr | Thr | Gln | Trp | Gln | Val | Leu | Pro | Cys | Ser | Phe | Thr | Thr | Leu | Pro | 290 | 295 | 300 | |
| Ala | Leu | Ser | Thr | Gly | Leu | Ile | His | Leu | His | Gln | Asn | Ile | Val | Asp | Val | 305 | 310 | 315 | 320 |
| Gln | Tyr | Leu | Tyr | Gly | Val | Gly | Ser | Ser | Ile | Ala | Ser | Trp | Ala | Ile | Lys | 325 | 330 | 335 | |
| Trp | Glu | Tyr | Val | Val | Leu | Leu | Phe | Leu | Leu | Leu | Ala | Asp | Ala | | | 340 | 345 | 350 | |

<210> 5

<211> 315

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus NS2 protein sequence

<400> 5

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Arg | Val | Cys | Ser | Cys | Leu | Trp | Met | Met | Leu | Leu | Ile | Ser | Gln | Ala | Glu | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| Ala | Ala | Leu | Glu | Asn | Leu | Val | Ile | Leu | Asn | Ala | Ala | Ser | Leu | Ala | Gly | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| Thr | His | Gly | Leu | Val | Ser | Phe | Leu | Val | Phe | Phe | Cys | Phe | Ala | Trp | Tyr | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| Leu | Lys | Gly | Arg | Trp | Val | Pro | Gly | Ala | Val | Tyr | Ala | Leu | Tyr | Gly | Met | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| Trp | Pro | Leu | Leu | Leu | Leu | Leu | Leu | Ala | Leu | Pro | Gln | Arg | Ala | Tyr | Ala | |
| 65 | | | | 70 | | | | | | 75 | | | | | 80 | |
| Leu | Asp | Thr | Glu | Val | Ala | Ala | Ser | Cys | Gly | Gly | Val | Val | Leu | Val | Gly | |
| | | | 85 | | | | | | 90 | | | | | 95 | | |
| Leu | Met | Ala | Leu | Thr | Leu | Ser | Pro | Tyr | Tyr | Lys | Arg | Tyr | Ile | Ser | Trp | |
| | | 100 | | | | | | 105 | | | | | 110 | | | |
| Cys | Met | Trp | Trp | Leu | Gln | Tyr | Phe | Leu | Thr | Arg | Val | Glu | Ala | Gln | Leu | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| His | Val | Trp | Val | Pro | Pro | Leu | Asn | Val | Arg | Gly | Gly | Arg | Asp | Ala | Val | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| Ile | Leu | Leu | Thr | Cys | Val | Val | His | Pro | Ala | Leu | Val | Phe | Asp | Ile | Thr | |
| 145 | | | | 150 | | | | | | 155 | | | | | 160 | |
| Lys | Leu | Leu | Leu | Ala | Ile | Phe | Gly | Pro | Leu | Trp | Ile | Leu | Gln | Ala | Ser | |
| | | | 165 | | | | | 170 | | | | | | 175 | | |
| Leu | Leu | Lys | Val | Pro | Tyr | Phe | Val | Arg | Val | Gln | Gly | Leu | Leu | Arg | Ile | |
| | | 180 | | | | | | 185 | | | | 190 | | | | |
| Cys | Ala | Leu | Ala | Arg | Lys | Ile | Ala | Gly | Gly | His | Tyr | Val | Gln | Met | Ala | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| Ile | Ile | Lys | Leu | Gly | Ala | Leu | Thr | Gly | Thr | Cys | Val | Tyr | Asn | His | Leu | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| Ala | Pro | Leu | Arg | Asp | Trp | Ala | His | Asn | Gly | Leu | Arg | Asp | Leu | Ala | Val | |
| 225 | | | | 230 | | | | | | 235 | | | | | 240 | |
| Ala | Val | Glu | Pro | Val | Val | Phe | Ser | Arg | Met | Glu | Thr | Lys | Leu | Ile | Thr | |
| | | | 245 | | | | | | 250 | | | | | 255 | | |
| Trp | Gly | Ala | Asp | Thr | Ala | Ala | Cys | Gly | Asp | Ile | Ile | Asn | Gly | Leu | Pro | |
| | | 260 | | | | | | 265 | | | | | 270 | | | |
| Val | Ser | Ala | Arg | Arg | Gly | Gln | Glu | Ile | Leu | Leu | Gly | Pro | Ala | Asp | Gly | |
| | | 275 | | | | 280 | | | | | | 285 | | | | |
| Met | Val | Ser | Lys | Gly | Trp | Arg | Leu | Leu | Ala | Pro | Ile | Thr | Ala | Tyr | Ala | |
| | 290 | | | | | 295 | | | | | 300 | | | | | |
| Gln | Gln | Thr | Arg | Gly | Leu | Leu | Gly | Cys | Ile | Ile | | | | | | |
| 305 | | | | | 310 | | | | | 315 | | | | | | |

<210> 6

<211> 613

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus NS3 protein sequence

<400> 6

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Thr | Ser | Leu | Thr | Gly | Arg | Asp | Lys | Asn | Gln | Val | Glu | Gly | Glu | Val | Gln | |
| 1 | | | | 5 | | | | 10 | | | | | 15 | | | |
| Ile | Val | Ser | Thr | Ala | Thr | Gln | Thr | Phe | Leu | Ala | Thr | Cys | Ile | Asn | Gly | |
| | | 20 | | | | | | 25 | | | | | 30 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Val | Cys | Trp | Thr | Val | Tyr | His | Gly | Ala | Gly | Thr | Arg | Thr | Ile | Ala | Ser | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| Pro | Lys | Gly | Pro | Val | Ile | Gln | Thr | Tyr | Thr | Asn | Val | Asp | Gln | Asp | Leu | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| Val | Gly | Trp | Pro | Ala | Pro | Gln | Gly | Ser | Arg | Ser | Leu | Thr | Pro | Cys | Thr | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| Cys | Gly | Ser | Ser | Asp | Leu | Tyr | Leu | Val | Thr | Arg | His | Ala | Asp | Val | Ile | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| Pro | Val | Arg | Arg | Arg | Gly | Asp | Ser | Arg | Gly | Ser | Leu | Leu | Ser | Pro | Arg | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| Pro | Ile | Ser | Tyr | Leu | Lys | Gly | Ser | Ser | Gly | Gly | Pro | Leu | Leu | Cys | Pro | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| Thr | Gly | His | Ala | Val | Gly | Leu | Phe | Arg | Ala | Ala | Val | Cys | Thr | Arg | Gly | |
| | 130 | | | | | 135 | | | | | | 140 | | | | |
| Val | Ala | Lys | Ala | Val | Asp | Phe | Ile | Pro | Val | Glu | Asn | Leu | Glu | Thr | Thr | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| Met | Arg | Ser | Pro | Val | Phe | Thr | Asp | Asn | Ser | Ser | Pro | Pro | Ala | Val | Pro | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| Gln | Ser | Phe | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | Gly | Ser | Gly | Lys | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Lys | Gly | Tyr | Lys | Val | Leu | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Leu | Gly | Phe | Gly | Ala | Tyr | Met | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| Ser | Lys | Ala | His | Gly | Val | Asp | Pro | Asn | Ile | Arg | Thr | Gly | Val | Arg | Thr | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | |
| Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | Gly | Lys | Phe | Leu | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| Ala | Asp | Ala | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | Ile | Ile | Cys | Asp | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Ser | Gly | Ile | Gly | Thr | Val | |
| | | 275 | | | | | 280 | | | | | 285 | | | | |
| Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Val | Val | Leu | Ala | Thr | |
| | 290 | | | | | 295 | | | | | 300 | | | | | |
| Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Ser | His | Pro | Asn | Ile | Glu | Glu | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | |
| Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | Gly | Lys | Ala | Ile | |
| | | | | 325 | | | | | 330 | | | | | 335 | | |
| Pro | Leu | Glu | Val | Ile | Lys | Gly | Gly | Arg | His | Leu | Ile | Phe | Cys | His | Ser | |
| | | | 340 | | | | | 345 | | | | | 350 | | | |
| Lys | Lys | Lys | Cys | Asp | Glu | Leu | Ala | Ala | Lys | Leu | Val | Ala | Leu | Gly | Ile | |
| | | 355 | | | | | 360 | | | | | 365 | | | | |
| Asn | Ala | Val | Ala | Tyr | Tyr | Arg | Gly | Leu | Asp | Val | Ser | Val | Ile | Pro | Thr | |
| | 370 | | | | | 375 | | | | | 380 | | | | | |
| Ser | Gly | Asp | Val | Val | Val | Val | Ser | Thr | Asp | Ala | Leu | Met | Thr | Gly | Phe | |
| 385 | | | | 390 | | | | | | 395 | | | | | 400 | |
| Thr | Gly | Asp | Phe | Asp | Ser | Val | Ile | Asp | Cys | Asn | Thr | Cys | Val | Thr | Gln | |
| | | | | 405 | | | | | 410 | | | | | 415 | | |
| Thr | Val | Asp | Phe | Ser | Leu | Asp | Pro | Thr | Phe | Thr | Ile | Glu | Thr | Thr | Thr | |
| | | | 420 | | | | | 425 | | | | | 430 | | | |
| Leu | Pro | Gln | Asp | Ala | Val | Ser | Arg | Thr | Gln | Arg | Arg | Gly | Arg | Thr | Gly | |
| | | 435 | | | | | 440 | | | | | 445 | | | | |
| Arg | Gly | Lys | Pro | Gly | Ile | Tyr | Arg | Phe | Val | Ala | Pro | Gly | Glu | Arg | Pro | |
| | 450 | | | | | 455 | | | | | 460 | | | | | |
| Ser | Gly | Met | Phe | Asp | Ser | Ser | Val | Leu | Cys | Glu | Cys | Tyr | Asp | Ala | Gly | |

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 465 | | 470 | | 475 | | 480 | | | | | | | | | |
| Cys | Ala | Trp | Tyr | Glu | Leu | Thr | Pro | Ala | Glu | Thr | Thr | Val | Arg | Leu | Arg |
| | | 485 | | | | | | | 490 | | | | | 495 | |
| Ala | Tyr | Met | Asn | Thr | Pro | Gly | Leu | Pro | Val | Cys | Gln | Asp | His | Leu | Gly |
| | | 500 | | | | | | 505 | | | | | 510 | | |
| Phe | Trp | Glu | Gly | Val | Phe | Thr | Gly | Leu | Thr | His | Ile | Asp | Ala | His | Phe |
| | 515 | | | | | | 520 | | | | | 525 | | | |
| Leu | Ser | Gln | Thr | Lys | Gln | Ser | Gly | Glu | Asn | Phe | Pro | Tyr | Leu | Val | Ala |
| | 530 | | | | | 535 | | | | | 540 | | | | |
| Tyr | Gln | Ala | Thr | Val | Cys | Ala | Arg | Ala | Gln | Ala | Pro | Pro | Pro | Ser | Trp |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |
| Asp | Gln | Met | Arg | Lys | Cys | Leu | Ile | Arg | Leu | Lys | Pro | Thr | Leu | His | Gly |
| | | | 565 | | | | | | 570 | | | | | 575 | |
| Pro | Thr | Pro | Leu | Leu | Tyr | Arg | Leu | Gly | Ala | Val | Gln | Asn | Glu | Val | Thr |
| | | 580 | | | | | | 585 | | | | | 590 | | |
| Leu | Thr | His | Pro | Ile | Thr | Lys | Tyr | Ile | Met | Thr | Cys | Met | Ser | Ala | Asp |
| | 595 | | | | | 600 | | | | | | 605 | | | |
| Leu | Glu | Val | Val | Thr | | | | | | | | | | | |
| | 610 | | | | | | | | | | | | | | |

<210> 7
 <211> 54
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Hepatitis C virus NS4A protein sequence

| |
|---|
| <400> 7 |
| Ser Thr Trp Val Leu Val Gly Gly Val Leu Ala Ala Leu Ala Ala Tyr |
| 1 5 10 15 |
| Cys Leu Ser Thr Gly Cys Val Val Ile Val Gly Arg Ile Val Leu Ser |
| 20 25 30 |
| Gly Lys Pro Ala Ile Ile Pro Asp Arg Glu Val Leu Tyr Gln Glu Phe |
| 35 40 45 |
| Asp Glu Met Glu Glu Cys |
| 50 |

<210> 8
 <211> 260
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Hepatitis C virus NS4B protein sequence

| |
|---|
| <400> 8 |
| Ser Gln His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu Ala Glu Gln |
| 1 5 10 15 |
| Phe Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser Arg His Ala |
| 20 25 30 |
| Glu Val Ile Thr Pro Ala Val Gln Thr Asn Trp Gln Lys Leu Glu Val |
| 35 40 45 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Phe | Trp | Ala | Lys | His | Met | Trp | Asn | Phe | Ile | Ser | Gly | Ile | Gln | Tyr | Leu |
| 50 | | | | | | 55 | | | | | 60 | | | | |
| Ala | Gly | Leu | Ser | Thr | Leu | Pro | Gly | Asn | Pro | Ala | Ile | Ala | Ser | Leu | Met |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Ala | Phe | Thr | Ala | Ala | Val | Thr | Ser | Pro | Leu | Thr | Thr | Gly | Gln | Thr | Leu |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Leu | Phe | Asn | Ile | Leu | Gly | Gly | Trp | Val | Ala | Ala | Gln | Leu | Ala | Ala | Pro |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Gly | Ala | Ala | Thr | Ala | Phe | Val | Gly | Ala | Gly | Leu | Ala | Gly | Ala | Ala | Leu |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Asp | Ser | Val | Gly | Leu | Gly | Lys | Val | Leu | Val | Asp | Ile | Leu | Ala | Gly | Tyr |
| | | 130 | | | | 135 | | | | | 140 | | | | |
| Gly | Ala | Gly | Val | Ala | Gly | Ala | Leu | Val | Ala | Phe | Lys | Ile | Met | Ser | Gly |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Glu | Val | Pro | Ser | Thr | Glu | Asp | Leu | Val | Asn | Leu | Leu | Pro | Ala | Ile | Leu |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Ser | Pro | Gly | Ala | Leu | Ala | Val | Gly | Val | Val | Phe | Ala | Ser | Ile | Leu | Arg |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Arg | Arg | Val | Gly | Pro | Gly | Glu | Gly | Ala | Val | Gln | Trp | Met | Asn | Arg | Leu |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Ile | Ala | Phe | Ala | Ser | Arg | Gly | Asn | His | Val | Ser | Pro | Thr | His | Tyr | Val |
| | | 210 | | | | 215 | | | | | 220 | | | | |
| Pro | Glu | Ser | Asp | Ala | Ala | Ala | Arg | Val | Thr | Ala | Ile | Leu | Ser | Ser | Leu |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Thr | Val | Thr | Gln | Leu | Leu | Arg | Arg | Leu | His | Gln | Trp | Ile | Ser | Ser | Glu |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Cys | Thr | Thr | Pro | | | | | | | | | | | | |
| | | | 260 | | | | | | | | | | | | |

<210> 9

<211> 1040

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus NS5A/B protein sequence

<400> 9

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Cys | Ser | Gly | Ser | Trp | Leu | Arg | Asp | Ile | Trp | Asp | Trp | Ile | Cys | Glu | Val |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Leu | Ser | Asp | Phe | Lys | Thr | Trp | Leu | Lys | Ala | Lys | Leu | Met | Pro | Gln | Leu |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Pro | Gly | Ile | Pro | Phe | Val | Ser | Cys | Gln | Arg | Gly | Tyr | Arg | Gly | Val | Trp |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Arg | Gly | Asp | Gly | Ile | Met | His | Thr | Arg | Cys | His | Cys | Gly | Ala | Glu | Ile |
| | | 50 | | | | 55 | | | | | 60 | | | | |
| Thr | Gly | His | Val | Lys | Asn | Gly | Thr | Met | Arg | Ile | Val | Gly | Pro | Arg | Thr |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Cys | Lys | Asn | Met | Trp | Ser | Gly | Thr | Phe | Phe | Ile | Asn | Ala | Tyr | Thr | Thr |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Gly | Pro | Cys | Thr | Pro | Leu | Pro | Ala | Pro | Asn | Tyr | Lys | Phe | Ala | Leu | Trp |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Arg | Val | Ser | Ala | Glu | Glu | Tyr | Val | Glu | Ile | Arg | Arg | Val | Gly | Asp | Phe |
| | | 115 | | | | | 120 | | | | | | 125 | | |

| | | | | | | | | | | | | | | | |
|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|
| Ile | Tyr | His | Ser | Val | Ser | His | Ala | Arg | Pro | Arg | Trp | Phe | Trp | Phe | Cys |
| 1010 | | | | 1015 | | | | 1020 | | | | | | | |
| Leu | Leu | Leu | Leu | Ala | Ala | Gly | Val | Gly | Ile | Tyr | Leu | Leu | Pro | Asn | Arg |
| 1025 | | | | 1030 | | | | 1035 | | | | 1040 | | | |

<210> 10
 <211> 226
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Hepatitis B virus S antigen (HBsAg) sequence

<400> 10

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Glu | Asn | Ile | Thr | Ser | Gly | Phe | Leu | Gly | Pro | Leu | Leu | Val | Leu | Gln |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Ala | Gly | Phe | Phe | Leu | Leu | Thr | Arg | Ile | Leu | Thr | Ile | Pro | Gln | Ser | Leu |
| | | | 20 | | | | 25 | | | | | 30 | | | |
| Asp | Ser | Trp | Trp | Thr | Ser | Leu | Asn | Phe | Leu | Gly | Gly | Thr | Thr | Val | Cys |
| | | 35 | | | | 40 | | | | | 45 | | | | |
| Leu | Gly | Gln | Asn | Ser | Gln | Ser | Pro | Thr | Ser | Asn | His | Ser | Pro | Thr | Ser |
| | 50 | | | | 55 | | | | 60 | | | | | | |
| Cys | Pro | Pro | Thr | Cys | Pro | Gly | Tyr | Arg | Trp | Met | Cys | Leu | Arg | Arg | Phe |
| 65 | | | | 70 | | | | 75 | | | | | | 80 | |
| Ile | Ile | Phe | Leu | Phe | Ile | Leu | Leu | Leu | Cys | Leu | Ile | Phe | Leu | Leu | Val |
| | | | 85 | | | | 90 | | | | | | 95 | | |
| Leu | Leu | Asp | Tyr | Gln | Gly | Met | Leu | Pro | Val | Cys | Pro | Leu | Ile | Pro | Gly |
| | | 100 | | | | 105 | | | | | 110 | | | | |
| Ser | Ser | Thr | Thr | Ser | Thr | Gly | Pro | Cys | Arg | Thr | Cys | Met | Thr | Thr | Ala |
| | | 115 | | | | 120 | | | | | 125 | | | | |
| Gln | Gly | Thr | Ser | Met | Tyr | Pro | Ser | Cys | Cys | Cys | Thr | Lys | Pro | Ser | Asp |
| | 130 | | | | 135 | | | | | 140 | | | | | |
| Gly | Asn | Cys | Thr | Cys | Ile | Pro | Ile | Pro | Ser | Ser | Trp | Ala | Phe | Gly | Lys |
| 145 | | | | 150 | | | | 155 | | | | | | 160 | |
| Phe | Leu | Trp | Glu | Trp | Ala | Ser | Ala | Arg | Phe | Ser | Trp | Leu | Ser | Leu | Leu |
| | | | 165 | | | | 170 | | | | | 175 | | | |
| Val | Pro | Phe | Val | Gln | Trp | Phe | Val | Gly | Leu | Ser | Pro | Thr | Val | Trp | Leu |
| | | 180 | | | | 185 | | | | | 190 | | | | |
| Ser | Val | Ile | Trp | Met | Met | Trp | Tyr | Trp | Gly | Pro | Ser | Leu | Tyr | Ser | Ile |
| | 195 | | | | 200 | | | | | 205 | | | | | |
| Leu | Ser | Pro | Phe | Leu | Pro | Leu | Leu | Pro | Ile | Phe | Phe | Cys | Leu | Trp | Val |
| | 210 | | | 215 | | | | 220 | | | | | | | |
| Tyr | Ile | | | | | | | | | | | | | | |
| 225 | | | | | | | | | | | | | | | |

<210> 11
 <211> 212
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Hepatitis B virus C antigen and e antigen
 (HBcAg/HBeAg) sequence

<400> 11

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Gln | Leu | Phe | His | Leu | Cys | Leu | Ile | Ile | Ser | Cys | Ser | Cys | Pro | Thr |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Val | Gln | Ala | Ser | Lys | Leu | Cys | Leu | Gly | Trp | Leu | Trp | Gly | Met | Asp | Ile |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Asp | Pro | Tyr | Lys | Glu | Phe | Gly | Ala | Thr | Val | Glu | Leu | Leu | Ser | Phe | Leu |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Pro | Ser | Asp | Phe | Phe | Pro | Ser | Val | Arg | Asp | Leu | Leu | Asp | Thr | Ala | Ser |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Ala | Leu | Tyr | Arg | Glu | Ala | Leu | Glu | Ser | Pro | Glu | His | Cys | Ser | Pro | His |
| 65 | | | | | 70 | | | | | 75 | | | | 80 | |
| His | Thr | Ala | Leu | Arg | Gln | Ala | Ile | Leu | Cys | Trp | Gly | Glu | Leu | Met | Thr |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Leu | Ala | Thr | Trp | Val | Gly | Val | Asn | Leu | Glu | Asp | Pro | Ala | Ser | Arg | Asp |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Leu | Val | Val | Ser | Tyr | Val | Asn | Thr | Asn | Met | Gly | Leu | Lys | Phe | Arg | Gln |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Leu | Leu | Trp | Phe | His | Ile | Ser | Cys | Leu | Thr | Phe | Gly | Arg | Glu | Thr | Val |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Ile | Glu | Tyr | Leu | Val | Ser | Phe | Gly | Val | Trp | Ile | Arg | Thr | Pro | Pro | Ala |
| 145 | | | | | 150 | | | | | 155 | | | | 160 | |
| Tyr | Arg | Pro | Pro | Asn | Ala | Pro | Ile | Leu | Ser | Thr | Leu | Pro | Glu | Thr | Thr |
| | | | | 165 | | | | | 170 | | | | 175 | | |
| Val | Val | Arg | Arg | Arg | Gly | Arg | Ser | Pro | Arg | Arg | Arg | Thr | Pro | Ser | Pro |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Arg | Arg | Arg | Arg | Ser | Gln | Ser | Pro | Arg | Arg | Arg | Arg | Ser | Gln | Ser | Arg |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Glu | Ser | Gln | Cys | | | | | | | | | | | | |
| | 210 | | | | | | | | | | | | | | |

<210> 12

<211> 2227

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis A virus sequence

<400> 12

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asn | Met | Ser | Lys | Gln | Gly | Ile | Phe | Gln | Thr | Val | Gly | Ser | Gly | Leu |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Asp | His | Ile | Leu | Ser | Leu | Ala | Asp | Ile | Glu | Glu | Glu | Gln | Met | Ile | Gln |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Ser | Val | Asp | Arg | Thr | Ala | Val | Thr | Gly | Ala | Ser | Tyr | Phe | Thr | Ser | Val |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Asp | Gln | Ser | Ser | Val | His | Thr | Ala | Glu | Val | Gly | Ser | His | Gln | Ile | Glu |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Pro | Leu | Lys | Thr | Ser | Val | Asp | Lys | Pro | Gly | Ser | Lys | Lys | Thr | Gln | Gly |
| 65 | | | | | 70 | | | | | 75 | | | | 80 | |
| Glu | Lys | Phe | Phe | Leu | Ile | His | Ser | Ala | Asp | Trp | Leu | Thr | Thr | His | Ala |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Leu | Phe | His | Glu | Val | Ala | Lys | Leu | Asp | Val | Val | Lys | Leu | Leu | Tyr | Asn |
| | | | 100 | | | | | 105 | | | | | 110 | | |

| | | | |
|---|---|-------------------------|------|
| 1425 | 1430 | 1435 | 1440 |
| Pro Ser Gly Glu | Pro Ser Asn Trp Lys Leu | Ser Ser Phe Phe Gln Ser | |
| | 1445 | 1450 | 1455 |
| Val Thr Asn His Lys Trp | Val Ala Val Gly Ala Ala Val Gly Ile Leu | | |
| | 1460 | 1465 | 1470 |
| Gly Val Leu Val Gly Gly Trp Phe Val Tyr Lys His Phe Ser Arg Lys | | | |
| | 1475 | 1480 | 1485 |
| Glu Glu Glu Pro Ile Pro Ala Glu Gly Val Tyr His Gly Val Thr Lys | | | |
| | 1490 | 1495 | 1500 |
| Pro Lys Gln Val Ile Lys Leu Asp Ala Asp Pro Val Glu Ser Gln Ser | | | |
| 1505 | 1510 | 1515 | 1520 |
| Thr Leu Glu Ile Ala Gly Leu Val Arg Lys Asn Leu Val Gln Phe Gly | | | |
| | 1525 | 1530 | 1535 |
| Val Gly Glu Lys Asn Gly Cys Val Arg Trp Val Met Asn Ala Leu Gly | | | |
| | 1540 | 1545 | 1550 |
| Val Lys Asp Asp Trp Leu Leu Val Pro Ser His Ala Tyr Lys Phe Glu | | | |
| | 1555 | 1560 | 1565 |
| Lys Asp Tyr Glu Met Met Glu Phe Tyr Phe Asn Arg Gly Gly Thr Tyr | | | |
| | 1570 | 1575 | 1580 |
| Tyr Ser Ile Ser Ala Gly Asn Val Val Ile Gln Ser Leu Asp Val Gly | | | |
| 1585 | 1590 | 1595 | 1600 |
| Phe Gln Asp Val Val Leu Met Lys Val Pro Thr Ile Pro Lys Phe Arg | | | |
| | 1605 | 1610 | 1615 |
| Asp Ile Thr Gln His Phe Ile Lys Lys Gly Asp Val Pro Arg Ala Leu | | | |
| | 1620 | 1625 | 1630 |
| Asn Arg Leu Ala Thr Leu Val Thr Thr Val Asn Gly Thr Pro Met Leu | | | |
| | 1635 | 1640 | 1645 |
| Ile Ser Glu Gly Pro Leu Lys Met Glu Glu Lys Ala Thr Tyr Val His | | | |
| | 1650 | 1655 | 1660 |
| Lys Lys Asn Asp Gly Thr Thr Val Asp Leu Thr Val Asp Gln Ala Trp | | | |
| 1665 | 1670 | 1675 | 1680 |
| Arg Gly Lys Gly Glu Gly Leu Pro Gly Met Cys Gly Gly Ala Leu Val | | | |
| | 1685 | 1690 | 1695 |
| Ser Ser Asn Gln Ser Ile Gln Asn Ala Ile Leu Gly Ile His Val Ala | | | |
| | 1700 | 1705 | 1710 |
| Gly Gly Asn Ser Ile Leu Val Ala Lys Leu Val Thr Gln Glu Met Phe | | | |
| | 1715 | 1720 | 1725 |
| Gln Asn Ile Asp Lys Lys Ile Glu Ser Gln Arg Ile Met Lys Val Glu | | | |
| | 1730 | 1735 | 1740 |
| Phe Thr Gln Cys Ser Met Asn Val Val Ser Lys Thr Leu Phe Arg Lys | | | |
| 1745 | 1750 | 1755 | 1760 |
| Ser Pro Ile His His His Ile Asp Lys Thr Met Ile Asn Phe Pro Ala | | | |
| | 1765 | 1770 | 1775 |
| Ala Met Pro Phe Ser Lys Ala Glu Ile Asp Pro Met Ala Met Met Leu | | | |
| | 1780 | 1785 | 1790 |
| Ser Lys Tyr Ser Leu Pro Ile Val Glu Glu Pro Glu Asp Tyr Lys Glu | | | |
| | 1795 | 1800 | 1805 |
| Ala Ser Val Phe Tyr Gln Asn Lys Ile Val Gly Lys Thr Gln Leu Val | | | |
| | 1810 | 1815 | 1820 |
| Asp Asp Phe Leu Asp Leu Asp Met Ala Ile Thr Gly Ala Pro Gly Ile | | | |
| 1825 | 1830 | 1835 | 1840 |
| Asp Ala Ile Asn Met Asp Ser Ser Pro Gly Phe Pro Tyr Val Gln Glu | | | |
| | 1845 | 1850 | 1855 |
| Lys Leu Thr Lys Arg Asp Leu Ile Trp Leu Asp Glu Asn Gly Leu Leu | | | |
| | 1860 | 1865 | 1870 |

| | |
|---|---|
| Leu Gly Val His Pro Arg | Leu Ala Gln Arg Ile Leu Phe Asn Thr Val |
| 1875 | 1880 1885 |
| Met Met Glu Asn Cys Ser Asp Leu Asp Val Val Phe Thr Thr Cys Pro | |
| 1890 | 1895 1900 |
| Lys Asp Glu Leu Arg Pro Leu Glu Lys Val Leu Glu Ser Lys Thr Arg | |
| 1905 | 1910 1915 1920 |
| Ala Ile Asp Ala Cys Pro Leu Asp Tyr Thr Ile Leu Cys Arg Met Tyr | |
| | 1925 1930 1935 |
| Trp Gly Pro Ala Ile Ser Tyr Phe His Leu Asn Pro Gly Phe His Thr | |
| | 1940 1945 1950 |
| Gly Val Ala Ile Gly Ile Asp Pro Asp Arg Gln Trp Asp Glu Leu Phe | |
| | 1955 1960 1965 |
| Lys Thr Met Ile Arg Phe Gly Asp Val Gly Leu Asp Leu Asp Phe Ser | |
| | 1970 1975 1980 |
| Ala Phe Asp Ala Ser Leu Ser Pro Phe Met Ile Arg Glu Ala Gly Arg | |
| 1985 | 1990 1995 2000 |
| Ile Met Ser Glu Leu Ser Gly Thr Pro Ser His Phe Gly Thr Ala Leu | |
| | 2005 2010 2015 |
| Ile Asn Thr Ile Ile Tyr Ser Lys His Leu Leu Tyr Asn Cys Cys Tyr | |
| | 2020 2025 2030 |
| His Val Cys Gly Ser Met Pro Ser Gly Ser Pro Cys Thr Ala Leu Leu | |
| | 2035 2040 2045 |
| Asn Ser Ile Ile Asn Asn Ile Asn Leu Tyr Tyr Val Phe Ser Lys Ile | |
| | 2050 2055 2060 |
| Phe Gly Lys Ser Pro Val Phe Phe Cys Gln Ala Leu Arg Ile Leu Cys | |
| 2065 | 2070 2075 2080 |
| Tyr Gly Asp Asp Val Leu Ile Val Phe Ser Arg Asp Val Gln Ile Asp | |
| | 2085 2090 2095 |
| Asn Leu Asp Leu Ile Gly Gln Lys Ile Val Asp Glu Phe Lys Lys Leu | |
| | 2100 / 2105 2110 |
| Gly Met Thr Ala Thr Ser Ala Asp Lys Asn Val Pro Gln Leu Lys Pro | |
| | 2115 2120 2125 |
| Val Ser Glu Leu Thr Phe Leu Lys Arg Ser Phe Asn Leu Val Glu Asp | |
| | 2130 2135 2140 |
| Arg Ile Arg Pro Ala Ile Ser Glu Lys Thr Ile Trp Ser Leu Met Ala | |
| 2145 | 2150 2155 2160 |
| Trp Gln Arg Ser Asn Ala Glu Phe Glu Gln Asn Leu Glu Asn Ala Gln | |
| | 2165 2170 2175 |
| Trp Phe Ala Phe Met His Gly Tyr Glu Phe Tyr Gln Lys Phe Tyr Tyr | |
| | 2180 2185 2190 |
| Phe Val Gln Ser Cys Leu Glu Lys Glu Met Ile Glu Tyr Arg Leu Lys | |
| | 2195 2200 2205 |
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| ccccctccc | gggagagcca | tagtgggtctg | cggaaaccgg | gagtacaccg | gaattgccag | 180 |
| gacgaccggg | tcctttcttg | gataaaccgc | ctcaatgcct | ggagatttgg | gcgtgcccc | 240 |
| gcaagactgc | tagccgagta | gtgttgggtc | gcgaaaggcc | ttgtgggtact | gcctgatagg | 300 |
| gtgcttgcga | gtgccccggg | aggtctcgta | gaccgtgcac | catgagcacg | aatcctaacc | 360 |
| ctcaaagaaa | aaccaaactg | aacaccaacc | gtcgccca | ggacgtcaag | ttcccgggtg | 420 |
| gcggtcagat | cgttgggtgga | gtttacttgt | tgccgcgcag | gggccctaga | ttgggtgtgc | 480 |
| gcgcgacgag | gaagacttcc | gagcgggtcgc | aacctcgagg | tagacgtcag | cctatcccca | 540 |
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| gcaatgaggg | ttgcgggtgg | gcgggatggc | tcctgtctcc | ccgtggctct | cggcctagct | 660 |
| ggggcccccac | agacccccgg | cgtaggtcgc | gcaatttggg | taaggtcac | gataccctta | 720 |
| cgtgcggcctt | cgccgacctc | atggggtaca | taccgtcgt | cggcgccctt | cttgaggcg | 780 |
| ctgccagggc | cctggcgcac | ggcgtccggg | ttctggaaga | cggcgtgaac | tatgcaacag | 840 |
| ggaaccttcc | tggttgctct | ttctctatct | tccttctggc | cctgctctct | tgctgactg | 900 |
| tgcccgttcc | agcctaccaa | gtgcgcaatt | cctcggggct | ttaccatgtc | accaatgatt | 960 |
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| acagctgggg | tgcaaatgat | acggatgtct | tcgtccttaa | caacaccagg | ccaccgctgg | 1980 |
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| cagaggaata | cgtggagata | aggcgggttg | gggacttcca | ctacgtatcg | ggcatgacta | 6660 |
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<220>

<223> Hepatitis B virus sequence

<400> 14

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| cgtttctcct | ggctcagttt | actagtgcc | tttgttcagt | ggttcgtagg | gctttccccc | 720 |
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| actgttcaag | cctccaagct | gtgccttggg | tggctttggg | gcatggacat | cgacccttat | 1920 |
| aaagaatttg | gagctactgt | ggagttactc | tcgtttttgc | cttctgactt | ctttccttca | 1980 |
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| accatattct | tgggaacaag | atctacagca | tggggcagaa | tctttccacc | agcaatcctc | 2880 |
| tgggattcct | tcccgaccac | cagttggatc | cagccttcag | agcaaacacc | gcaa | 2940 |

| | | | | | | |
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| attgggactt | caatcccaac | aaggacacct | ggccagacgc | caacaaggta | ggagctggag | 3000 |
| cattcgggct | gggttttcacc | ccaccgcacg | gaggcctttt | gggttgaggc | cctcaggctc | 3060 |
| agggcatact | acaaactttg | ccagcaaate | cgctctctgc | ctccaccaat | cgccagtcag | 3120 |
| gaaggcagcc | taccccgctg | tctccacctt | tgagaaacac | tcctcctcag | gccatgcagt | 3180 |
| gg | | | | | | 3182 |

<210> 15

<211> 7478

<212> DNA

<213> Artificial Sequence

<220>

<223> Hepatitis A virus sequence

<400> 15

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| tgatacctca | cgcgcgtttg | cctaggtctat | aggctaaatt | tccctttccc | tgtccctccc | 120 |
| ttatttccct | ttgttttgct | tgtaaataatt | aattcctgca | ggttcagggt | tctttaatct | 180 |
| gtttctctat | aagaacactc | aatttttcacg | ctttctgtct | tctttcttcc | agggctctcc | 240 |
| ccttgcccta | ggctctggcc | gttgcgcccc | gcggggtcaa | ctccatgatt | agcatggagc | 300 |
| tgtaggagtc | taaattgggg | acgcagatgt | ttgggacgtc | accttgagtc | gttaacttgg | 360 |
| ctctcatgaa | cctctttgat | cttcacacaag | gggtaggcta | cgggtgaaac | ctcttaggct | 420 |
| aatactttcta | tgaagagatg | ctttggatag | ggtaacagcg | gcggatattg | gtgagttggt | 480 |
| aagacaaaaa | ccattcaacg | ccggaggact | ggctctcatc | cagtggatgc | attgagtggg | 540 |
| ttgattgtca | gggctgtctc | taggtttaat | ctcagacctc | tctgtgctta | gggcaaacac | 600 |
| catttgccct | taaatgggat | cctgtgagag | ggggtccctc | cattgacagc | tggactgttc | 660 |
| tttggggcct | tatgtgggtg | ttgcctctga | ggtaactcagg | ggcatttagg | tttttcctca | 720 |
| ttcttaaaaca | ataatgaata | tgtccaaaca | aggaattttc | cagactgttg | ggagtggcct | 780 |
| tgaccacatc | ctgtctttgg | cagatattga | ggaagagcaa | atgattcagt | ccgttgatag | 840 |
| gactgcagtg | actggagcct | cttacttcac | ttctgtggac | caatcttcag | ttcatactgc | 900 |
| tgagggttggc | tcacatcaaa | ttgaaccttt | gaaaacctct | gttgataaac | ctggttctaa | 960 |
| gaaaactcag | ggggaaaagt | ttttcctgat | tcattctgct | gattggctca | ctacacatgc | 1020 |
| tctctttcat | gaagtgtcaa | aattggatgt | ggtgaaacta | ctgtataatg | agcagtttgc | 1080 |
| cgtccaaggt | ttgttgagat | accatacata | tgcaagattt | ggcattgaga | ttcaagttca | 1140 |
| gataaatccc | acaccctttc | agcaaggagg | actaatttgt | gccatgggtc | ctggtgacca | 1200 |
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| caacaatgta | gttagaataa | aggttccatt | tatttatact | agaggtgctt | atcattttta | 1320 |
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| tactacctgg | acatccattc | caaccttagc | tgctcagttt | ccatttaatg | cttcagattc | 1680 |
| agttggacaa | caaattaaag | ttattccagt | ggaccatac | tttttccaaa | tgacaaacac | 1740 |
| taatcctgat | caaaaatgta | taactgcctt | ggcctctatt | tgtcagatgt | tctgcttttg | 1800 |
| gaggggagat | cctgtttttg | attttcaggt | ttttccaacc | aaatatcatt | caggtagact | 1860 |
| gttgttttgt | ttgtttcctg | ggaatgagtt | aatagatgtt | actggaatta | cattaaaaca | 1920 |
| ggcaactact | gctccttggt | cagtgatgga | cattacagga | gtgcagtcaa | ccttgagatt | 1980 |
| tcgtgttcct | tggattttctg | atacacctta | tcgagtgaat | aggtacacga | agtcagcaca | 2040 |
| tcaaaaaggt | gagtacactg | ccattgggaa | gcttattgtg | tattgttata | acagactgac | 2100 |
| ttctccttct | aatgttgctt | ctcatgttag | agttaatgtt | tatctttcag | caattaattt | 2160 |
| ggaatgtttt | gctcctcttt | accatgctat | ggatgttact | acacaggttg | gagatgattc | 2220 |
| aggaggtttc | tcaacaacag | tttctacaga | gcagaatgtt | cctgatcccc | aagttgggat | 2280 |
| aacaaccatg | agggatttaa | aaggaaaagc | caatagggga | aagatggatg | tttcaggagt | 2340 |
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<210> 17

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus NS3/4A peptide

<400> 17

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Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys
      35          40          45
Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr
      50          55          60
Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp
65          70          75          80
Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr
      85          90          95
Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala
      100         105         110
Asp Val Ile Pro Val Arg Arg Arg Gly Asp Gly Arg Gly Ser Leu Leu
      115         120         125
Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu
      130         135         140
Leu Cys Pro Ala Gly His Ala Val Gly Ile Phe Arg Ala Ala Val Cys
145         150         155         160
Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser Leu
      165         170         175
Glu Thr Thr Met Arg Ser Pro Val Phe Ser Asp Asn Ser Ser Pro Pro

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| | | | | | | | | | | | | | | | | |
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| | | | 180 | | | | 185 | | | | | 190 | | | | |
| Ala | Val | Pro | Gln | Ser | Tyr | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | Gly | |
| | | | 195 | | | | 200 | | | | | 205 | | | | |
| Ser | Gly | Lys | Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Gln | Gly | Tyr | |
| | | | 210 | | | | 215 | | | | | 220 | | | | |
| Lys | Val | Leu | Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Met | Gly | Phe | Gly | |
| 225 | | | | 230 | | | | 235 | | | | | 240 | | | |
| Ala | Tyr | Met | Ser | Lys | Ala | His | Gly | Ile | Asp | Pro | Asn | Ile | Arg | Thr | Gly | |
| | | | 245 | | | | 250 | | | | | 255 | | | | |
| Val | Arg | Thr | Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | Gly | |
| | | | 260 | | | | 265 | | | | | 270 | | | | |
| Lys | Phe | Leu | Ala | Asp | Gly | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | Ile | |
| | | | 275 | | | | 280 | | | | | 285 | | | | |
| Ile | Cys | Asp | Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Leu | Gly | Ile | |
| | | | 290 | | | | 295 | | | | | 300 | | | | |
| Gly | Thr | Val | Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Thr | Val | |
| 305 | | | | 310 | | | | 315 | | | | | 320 | | | |
| Leu | Ala | Thr | Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Pro | His | Pro | Asn | |
| | | | 325 | | | | 330 | | | | | 335 | | | | |
| Ile | Glu | Glu | Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | Gly | |
| | | | 340 | | | | 345 | | | | | 350 | | | | |
| Lys | Ala | Ile | Pro | Leu | Glu | Ala | Ile | Lys | Gly | Gly | Arg | His | Leu | Ile | Phe | |
| | | | 355 | | | | 360 | | | | | 365 | | | | |
| Cys | His | Ser | Lys | Lys | Lys | Cys | Asp | Glu | Leu | Ala | Ala | Lys | Leu | Val | Ala | |
| | | | 370 | | | | 375 | | | | | 380 | | | | |
| Leu | Gly | Val | Asn | Ala | Val | Ala | Tyr | Tyr | Arg | Gly | Leu | Asp | Val | Ser | Val | |
| 385 | | | | 390 | | | | 395 | | | | | 400 | | | |
| Ile | Pro | Thr | Ser | Gly | Asp | Val | Val | Val | Val | Ala | Thr | Asp | Ala | Leu | Met | |
| | | | 405 | | | | 410 | | | | | 415 | | | | |
| Thr | Gly | Phe | Thr | Gly | Asp | Phe | Asp | Ser | Val | Ile | Asp | Cys | Asn | Thr | Cys | |
| | | | 420 | | | | 425 | | | | | 430 | | | | |
| Val | Thr | Gln | Thr | Val | Asp | Phe | Ser | Leu | Asp | Pro | Thr | Phe | Thr | Ile | Glu | |
| | | | 435 | | | | 440 | | | | | 445 | | | | |
| Thr | Ile | Thr | Leu | Pro | Gln | Asp | Ala | Val | Ser | Arg | Thr | Gln | Arg | Arg | Gly | |
| | | | 450 | | | | 455 | | | | | 460 | | | | |
| Arg | Thr | Gly | Arg | Gly | Lys | Pro | Gly | Ile | Tyr | Arg | Phe | Val | Ala | Pro | Gly | |
| 465 | | | | 470 | | | | 475 | | | | | 480 | | | |
| Glu | Arg | Pro | Ser | Gly | Met | Phe | Asp | Ser | Ser | Val | Leu | Cys | Glu | Cys | Tyr | |
| | | | 485 | | | | 490 | | | | | 495 | | | | |
| Asp | Ala | Gly | Cys | Ala | Trp | Tyr | Glu | Leu | Thr | Pro | Ala | Glu | Thr | Thr | Val | |
| | | | 500 | | | | 505 | | | | | 510 | | | | |
| Arg | Leu | Arg | Ala | Tyr | Met | Asn | Thr | Pro | Gly | Leu | Pro | Val | Cys | Gln | Asp | |
| | | | 515 | | | | 520 | | | | | 525 | | | | |
| His | Leu | Glu | Phe | Trp | Glu | Gly | Val | Phe | Thr | Gly | Leu | Thr | His | Ile | Asp | |
| | | | 530 | | | | 535 | | | | | 540 | | | | |
| Ala | His | Phe | Leu | Ser | Gln | Thr | Lys | Gln | Ser | Gly | Glu | Asn | Leu | Pro | Tyr | |
| 545 | | | | 550 | | | | 555 | | | | | 560 | | | |
| Leu | Val | Ala | Tyr | Gln | Ala | Thr | Val | Cys | Ala | Arg | Ala | Gln | Ala | Pro | Pro | |
| | | | 565 | | | | 570 | | | | | 575 | | | | |
| Pro | Ser | Trp | Asp | Gln | Met | Trp | Lys | Cys | Leu | Ile | Arg | Leu | Lys | Pro | Thr | |
| | | | 580 | | | | 585 | | | | | 590 | | | | |
| Leu | His | Gly | Pro | Thr | Pro | Leu | Leu | Tyr | Arg | Leu | Gly | Ala | Val | Gln | Asn | |
| | | | 595 | | | | 600 | | | | | 605 | | | | |
| Glu | Val | Thr | Leu | Thr | His | Pro | Val | Thr | Lys | Tyr | Ile | Met | Thr | Cys | Met | |
| | | | 610 | | | | 615 | | | | | 620 | | | | |

Ser Ala Asp Leu Glu Val Val Thr Ser Thr Trp Val Leu Val Gly Gly
625 630 635 640
Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val
645 650 655
Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp
660 665 670
Arg Glu Val Leu Tyr Arg Glu Phe Asp Glu Met Glu Glu Cys
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<210> 22

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<220>
<223> Mutant Hepatitis C virus NS3/4A peptide

<400> 26
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 Thr Trp Val Leu Val Gly Gly Val Leu
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<220>
 <223> Hepatitis C virus NS3/4A peptide

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<210> 29
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 <213> Hepatitis C virus NS3 peptideArtificial Sequence

<220>
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 35 40 45
 Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr
 50 55 60
 Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp
 65 70 75 80
 Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr

His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile Asp
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 Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Leu Pro Tyr
 545 550 555 560
 Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro
 565 570 575
 Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr
 580 585 590
 Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn
 595 600 605
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 35 40 45
 Asp Glu Met Glu Glu Cys
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 20 25 30
 Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys
 35 40 45
 Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr
 50 55 60
 Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp
 65 70 75 80
 Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Cys | Thr | Cys | Gly | Ser | Ser | Asp | Leu | Tyr | Leu | Val | Thr | Arg | His | Ala |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Asp | Val | Ile | Pro | Val | Arg | Arg | Arg | Gly | Asp | Gly | Arg | Gly | Ser | Leu | Leu |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ser | Pro | Arg | Pro | Ile | Ser | Tyr | Leu | Lys | Gly | Ser | Ser | Gly | Gly | Pro | Leu |
| | | 130 | | | | 135 | | | | | 140 | | | | |
| Leu | Cys | Pro | Ala | Gly | His | Ala | Val | Gly | Ile | Phe | Arg | Ala | Ala | Val | Cys |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Thr | Arg | Gly | Val | Ala | Lys | Ala | Val | Asp | Phe | Ile | Pro | Val | Glu | Ser | Leu |
| | | | | 165 | | | | 170 | | | | | | 175 | |
| Glu | Thr | Thr | Met | Arg | Ser | Pro | Val | Phe | Ser | Asp | Asn | Ser | Ser | Pro | Pro |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Ala | Val | Pro | Gln | Ser | Tyr | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | Gly |
| | | 195 | | | | 200 | | | | | | 205 | | | |
| Ser | Gly | Lys | Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Gln | Gly | Tyr |
| | | 210 | | | | 215 | | | | | 220 | | | | |
| Lys | Val | Leu | Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Met | Gly | Phe | Gly |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Ala | Tyr | Met | Ser | Lys | Ala | His | Gly | Ile | Asp | Pro | Asn | Ile | Arg | Thr | Gly |
| | | | | 245 | | | | 250 | | | | | | 255 | |
| Val | Arg | Thr | Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | Gly |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Lys | Phe | Leu | Ala | Asp | Gly | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | Ile |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Ile | Cys | Asp | Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Leu | Gly | Ile |
| | | 290 | | | | 295 | | | | | 300 | | | | |
| Gly | Thr | Val | Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Thr | Val |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Leu | Ala | Thr | Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Pro | His | Pro | Asn |
| | | | | 325 | | | | 330 | | | | | | 335 | |
| Ile | Glu | Glu | Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | Gly |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Lys | Ala | Ile | Pro | Leu | Glu | Ala | Ile | Lys | Gly | Gly | Arg | His | Leu | Ile | Phe |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Cys | His | Ser | Lys | Lys | Lys | Cys | Asp | Glu | Leu | Ala | Ala | Lys | Leu | Val | Ala |
| | | 370 | | | | 375 | | | | | 380 | | | | |
| Leu | Gly | Val | Asn | Ala | Val | Ala | Tyr | Tyr | Arg | Gly | Leu | Asp | Val | Ser | Val |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| Ile | Pro | Thr | Ser | Gly | Asp | Val | Val | Val | Val | Ala | Thr | Asp | Ala | Leu | Met |
| | | | | 405 | | | | 410 | | | | | | 415 | |
| Thr | Gly | Phe | Thr | Gly | Asp | Phe | Asp | Ser | Val | Ile | Asp | Cys | Asn | Thr | Cys |
| | | | 420 | | | | 425 | | | | | | 430 | | |
| Val | Thr | Gln | Thr | Val | Asp | Phe | Ser | Leu | Asp | Pro | Thr | Phe | Thr | Ile | Glu |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| Thr | Ile | Thr | Leu | Pro | Gln | Asp | Ala | Val | Ser | Arg | Thr | Gln | Arg | Arg | Gly |
| | | 450 | | | | 455 | | | | | 460 | | | | |
| Arg | Thr | Gly | Arg | Gly | Lys | Pro | Gly | Ile | Tyr | Arg | Phe | Val | Ala | Pro | Gly |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 |
| Glu | Arg | Pro | Ser | Gly | Met | Phe | Asp | Ser | Ser | Val | Leu | Cys | Glu | Cys | Tyr |
| | | | | 485 | | | | 490 | | | | | 495 | | |
| Asp | Ala | Gly | Cys | Ala | Trp | Tyr | Glu | Leu | Thr | Pro | Ala | Glu | Thr | Thr | Val |
| | | | 500 | | | | | 505 | | | | 510 | | | |
| Arg | Leu | Arg | Ala | Tyr | Met | Asn | Thr | Pro | Gly | Leu | Pro | Val | Cys | Gln | Asp |
| | | 515 | | | | | 520 | | | | | 525 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| His | Leu | Glu | Phe | Trp | Glu | Gly | Val | Phe | Thr | Gly | Leu | Thr | His | Ile | Asp |
| 530 | | | | | | 535 | | | | | 540 | | | | |
| Ala | His | Phe | Leu | Ser | Gln | Thr | Lys | Gln | Ser | Gly | Glu | Asn | Leu | Pro | Tyr |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |
| Leu | Val | Ala | Tyr | Gln | Ala | Thr | Val | Cys | Ala | Arg | Ala | Gln | Ala | Pro | Pro |
| | | | | 565 | | | | | | 570 | | | | | 575 |
| Pro | Ser | Trp | Asp | Gln | Met | Trp | Lys | Cys | Leu | Ile | Arg | Leu | Lys | Pro | Thr |
| | | | 580 | | | | | 585 | | | | | 590 | | |
| Leu | His | Gly | Pro | Thr | Pro | Leu | Leu | Tyr | Arg | Leu | Gly | Ala | Val | Gln | Asn |
| | | 595 | | | | | 600 | | | | | 605 | | | |
| Glu | Val | Thr | Leu | Thr | His | Pro | Val | Thr | Lys | Tyr | Ile | Met | Thr | Cys | Met |
| | | 610 | | | | 615 | | | | | 620 | | | | |
| Ser | Ala | Asp | Leu | Glu | Val | Val | Thr | Gly | Thr | Trp | Val | Leu | Val | Gly | Gly |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 |
| Val | Leu | Ala | Ala | Leu | Ala | Ala | Tyr | Cys | Leu | Ser | Thr | Gly | Cys | Val | Val |
| | | | | 645 | | | | | | 650 | | | | | 655 |
| Ile | Val | Gly | Arg | Ile | Val | Leu | Ser | Gly | Lys | Pro | Ala | Ile | Ile | Pro | Asp |
| | | | 660 | | | | | 665 | | | | | 670 | | |
| Arg | Glu | Val | Leu | Tyr | Arg | Glu | Phe | Asp | Glu | Met | Glu | Glu | Cys | | |
| | | 675 | | | | | 680 | | | | | 685 | | | |

<210> 32

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 32

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Pro | Ile | Thr | Ala | Tyr | Ala | Gln | Gln | Thr | Arg | Gly | Leu | Leu | Gly |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Cys | Ile | Ile | Thr | Ser | Leu | Thr | Gly | Arg | Asp | Lys | Asn | Gln | Val | Glu | Gly |
| | | | 20 | | | | | 25 | | | | 30 | | | |
| Glu | Val | Gln | Ile | Val | Ser | Thr | Ala | Ala | Gln | Thr | Phe | Leu | Ala | Thr | Cys |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Ile | Asn | Gly | Val | Cys | Trp | Thr | Val | Tyr | His | Gly | Ala | Gly | Thr | Arg | Thr |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Ile | Ala | Ser | Pro | Lys | Gly | Pro | Val | Ile | Gln | Met | Tyr | Thr | Asn | Val | Asp |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Gln | Asp | Leu | Val | Gly | Trp | Pro | Ala | Pro | Gln | Gly | Ala | Arg | Ser | Leu | Thr |
| | | | 85 | | | | | | 90 | | | | | 95 | |
| Pro | Cys | Thr | Cys | Gly | Ser | Ser | Asp | Leu | Tyr | Leu | Val | Thr | Arg | His | Ala |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Asp | Val | Ile | Pro | Val | Arg | Arg | Arg | Gly | Asp | Gly | Arg | Gly | Ser | Leu | Leu |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ser | Pro | Arg | Pro | Ile | Ser | Tyr | Leu | Lys | Gly | Ser | Ser | Gly | Gly | Pro | Leu |
| | | 130 | | | | 135 | | | | | 140 | | | | |
| Leu | Cys | Pro | Ala | Gly | His | Ala | Val | Gly | Ile | Phe | Arg | Ala | Ala | Val | Cys |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Thr | Arg | Gly | Val | Ala | Lys | Ala | Val | Asp | Phe | Ile | Pro | Val | Glu | Ser | Leu |
| | | | 165 | | | | | | 170 | | | | | 175 | |
| Glu | Thr | Thr | Met | Arg | Ser | Pro | Val | Phe | Ser | Asp | Asn | Ser | Ser | Pro | Pro |
| | | | 180 | | | | | 185 | | | | | 190 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 625 | | 630 | | 635 | | 640 | | | | | | | | | |
| Val | Leu | Ala | Ala | Leu | Ala | Ala | Tyr | Cys | Leu | Ser | Thr | Gly | Cys | Val | Val |
| | | | | 645 | | | | | 650 | | | | | 655 | |
| Ile | Val | Gly | Arg | Ile | Val | Leu | Ser | Gly | Lys | Pro | Ala | Ile | Ile | Pro | Asp |
| | | | 660 | | | | | 665 | | | | | 670 | | |
| Arg | Glu | Val | Leu | Tyr | Arg | Glu | Phe | Asp | Glu | Met | Glu | Glu | Cys | | |
| | | 675 | | | | | 680 | | | | | 685 | | | |

<210> 33
 <211> 25
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Mutant Hepatitis C virus NS3/4A peptide

| |
|---|
| <400> 33 |
| Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Leu Glu Val Val Thr Pro |
| 1 5 10 15 |
| Thr Trp Val Leu Val Gly Gly Val Leu |
| 20 25 |

<210> 34
 <211> 25
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Mutant Hepatitis C virus NS3/4A peptide

| |
|---|
| <400> 34 |
| Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Leu Glu Val Val Arg Pro |
| 1 5 10 15 |
| Thr Trp Val Leu Val Gly Gly Val Leu |
| 20 25 |

<210> 35
 <211> 25
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Mutant Hepatitis C virus NS3/4A peptide

| |
|---|
| <400> 35 |
| Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Leu Glu Val Val Arg Pro |
| 1 5 10 15 |
| Ala Trp Val Leu Val Gly Gly Val Leu |
| 20 25 |

<210> 36

<211> 25
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutant Hepatitis C virus NS3/4A peptide

<400> 36
Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Leu Glu Val Val Cys Ser
1 5 10 15
Thr Trp Val Leu Val Gly Gly Val Leu
20 25

<210> 37
<211> 25
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutant Hepatitis C virus NS3/4A peptide

<400> 37
Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Leu Glu Val Cys Cys Ser
1 5 , 10 15
Thr Trp Val Leu Val Gly Gly Val Leu
20 25

<210> 38
<211> 25
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutant Hepatitis C virus NS3/4A peptide

<400> 38
Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Leu Glu Val Ser Ser Ser
1 5 10 15
Thr Trp Val Leu Val Gly Gly Val Leu
20 25

<210> 39
<211> 25
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutant Hepatitis C virus NS3/4A peptide

<400> 39
Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Ser Ser Ser Ser Cys Ser
1 5 10 15

Thr Trp Val Leu Val Gly Gly Val Leu
 20 25

<210> 40
 <211> 25
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Mutant Hepatitis C virus NS3/4A peptide

<400> 40
 Thr Lys Tyr Met Thr Cys Met Ser Ala Asp Val Val Val Val Thr Ser
 1 5 10 15
 Thr Trp Val Leu Val Gly Gly Val Leu
 20 25

<210> 41
 <211> 16
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Hepatitis C virus NS5 peptide

<400> 41
 Ala Ser Glu Asp Val Val Cys Cys Ser Met Ser Tyr Thr Trp Thr Gly
 1 5 10 15

<210> 42
 <211> 18
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Mutant Hepatitis C virus NS5A/B peptide

<400> 42
 Ser Ser Glu Asp Val Val Cys Cys Ser Met Trp Val Leu Val Gly Gly
 1 5 10 15
 Val Leu

<210> 43
 <211> 686
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Mutant Hepatitis C virus NS3/4A

[illegible][illegible]

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Thr | Gln | Thr | Val | Asp | Phe | Ser | Leu | Asp | Pro | Thr | Phe | Thr | Ile | Glu |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| Thr | Ile | Thr | Leu | Pro | Gln | Asp | Ala | Val | Ser | Arg | Thr | Gln | Arg | Arg | Gly |
| | | 450 | | | | 455 | | | | | 460 | | | | |
| Arg | Thr | Gly | Arg | Gly | Lys | Pro | Gly | Ile | Tyr | Arg | Phe | Val | Ala | Pro | Gly |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 |
| Glu | Arg | Pro | Ser | Gly | Met | Phe | Asp | Ser | Ser | Val | Leu | Cys | Glu | Cys | Tyr |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| Asp | Ala | Gly | Cys | Ala | Trp | Tyr | Glu | Leu | Thr | Pro | Ala | Glu | Thr | Thr | Val |
| | | | 500 | | | | | 505 | | | | | 510 | | |
| Arg | Leu | Arg | Ala | Tyr | Met | Asn | Thr | Pro | Gly | Leu | Pro | Val | Cys | Gln | Asp |
| | | 515 | | | | | 520 | | | | | 525 | | | |
| His | Leu | Glu | Phe | Trp | Glu | Gly | Val | Phe | Thr | Gly | Leu | Thr | His | Ile | Asp |
| | 530 | | | | | 535 | | | | | 540 | | | | |
| Ala | His | Phe | Leu | Ser | Gln | Thr | Lys | Gln | Ser | Gly | Glu | Asn | Leu | Pro | Tyr |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |
| Leu | Val | Ala | Tyr | Gln | Ala | Thr | Val | Cys | Ala | Arg | Ala | Gln | Ala | Pro | Pro |
| | | | | 565 | | | | | 570 | | | | | 575 | |
| Pro | Ser | Trp | Asp | Gln | Met | Trp | Lys | Cys | Leu | Ile | Arg | Leu | Lys | Pro | Thr |
| | | | 580 | | | | | 585 | | | | | 590 | | |
| Leu | His | Gly | Pro | Thr | Pro | Leu | Leu | Tyr | Arg | Leu | Gly | Ala | Val | Gln | Asn |
| | | 595 | | | | | 600 | | | | | 605 | | | |
| Glu | Val | Thr | Leu | Thr | His | Pro | Val | Thr | Lys | Tyr | Ile | Met | Thr | Cys | Met |
| | 610 | | | | | 615 | | | | | 620 | | | | |
| Ser | Ala | Asp | Leu | Glu | Val | Val | Thr | Pro | Thr | Trp | Val | Leu | Val | Gly | Gly |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 |
| Val | Leu | Ala | Ala | Leu | Ala | Ala | Tyr | Cys | Leu | Ser | Thr | Gly | Cys | Val | Val |
| | | | | 645 | | | | | 650 | | | | | 655 | |
| Ile | Val | Gly | Arg | Ile | Val | Leu | Ser | Gly | Lys | Pro | Ala | Ile | Ile | Pro | Asp |
| | | | 660 | | | | | 665 | | | | | 670 | | |
| Arg | Glu | Val | Leu | Tyr | Arg | Glu | Phe | Asp | Glu | Met | Glu | Glu | Cys | | |
| | | 675 | | | | | 680 | | | | | 685 | | | |

<210> 44

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 44

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Pro | Ile | Thr | Ala | Tyr | Ala | Gln | Gln | Thr | Arg | Gly | Leu | Leu | Gly |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Cys | Ile | Ile | Thr | Ser | Leu | Thr | Gly | Arg | Asp | Lys | Asn | Gln | Val | Glu | Gly |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Glu | Val | Gln | Ile | Val | Ser | Thr | Ala | Ala | Gln | Thr | Phe | Leu | Ala | Thr | Cys |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Ile | Asn | Gly | Val | Cys | Trp | Thr | Val | Tyr | His | Gly | Ala | Gly | Thr | Arg | Thr |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Ile | Ala | Ser | Pro | Lys | Gly | Pro | Val | Ile | Gln | Met | Tyr | Thr | Asn | Val | Asp |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Gln | Asp | Leu | Val | Gly | Trp | Pro | Ala | Pro | Gln | Gly | Ala | Arg | Ser | Leu | Thr |
| | | | | 85 | | | | | 90 | | | | | 95 | |

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Pro | Cys | Thr | Cys | Gly | Ser | Ser | Asp | Leu | Tyr | Leu | Val | Thr | Arg | His | Ala | | |
| | | | 100 | | | | | 105 | | | | | 110 | | | | |
| Asp | Val | Ile | Pro | Val | Arg | Arg | Arg | Gly | Asp | Gly | Arg | Gly | Ser | Leu | Leu | | |
| | | 115 | | | | | 120 | | | | | 125 | | | | | |
| Ser | Pro | Arg | Pro | Ile | Ser | Tyr | Leu | Lys | Gly | Ser | Ser | Gly | Gly | Pro | Leu | | |
| | | 130 | | | | 135 | | | | | 140 | | | | | | |
| Leu | Cys | Pro | Ala | Gly | His | Ala | Val | Gly | Ile | Phe | Arg | Ala | Ala | Val | Cys | | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | | |
| Thr | Arg | Gly | Val | Ala | Lys | Ala | Val | Asp | Phe | Ile | Pro | Val | Glu | Ser | Leu | | |
| | | | | 165 | | | | | 170 | | | | | | 175 | | |
| Glu | Thr | Thr | Met | Arg | Ser | Pro | Val | Phe | Ser | Asp | Asn | Ser | Ser | Pro | Pro | | |
| | | | 180 | | | | | 185 | | | | | 190 | | | | |
| Ala | Val | Pro | Gln | Ser | Tyr | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | Gly | | |
| | | 195 | | | | | 200 | | | | | 205 | | | | | |
| Ser | Gly | Lys | Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Gln | Gly | Tyr | | |
| | | 210 | | | | 215 | | | | | 220 | | | | | | |
| Lys | Val | Leu | Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Met | Gly | Phe | Gly | | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | | |
| Ala | Tyr | Met | Ser | Lys | Ala | His | Gly | Ile | Asp | Pro | Asn | Ile | Arg | Thr | Gly | | |
| | | | | 245 | | | | | 250 | | | | | | 255 | | |
| Val | Arg | Thr | Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | Gly | | |
| | | | 260 | | | | | 265 | | | | | 270 | | | | |
| Lys | Phe | Leu | Ala | Asp | Gly | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | Ile | | |
| | | 275 | | | | | 280 | | | | | 285 | | | | | |
| Ile | Cys | Asp | Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Leu | Gly | Ile | | |
| | | 290 | | | | 295 | | | | | 300 | | | | | | |
| Gly | Thr | Val | Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Thr | Val | | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | | |
| Leu | Ala | Thr | Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Pro | His | Pro | Asn | | |
| | | | | 325 | | | | | 330 | | | | | | 335 | | |
| Ile | Glu | Glu | Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | Gly | | |
| | | | 340 | | | | | 345 | | | | | 350 | | | | |
| Lys | Ala | Ile | Pro | Leu | Glu | Ala | Ile | Lys | Gly | Gly | Arg | His | Leu | Ile | Phe | | |
| | | 355 | | | | | 360 | | | | | 365 | | | | | |
| Cys | His | Ser | Lys | Lys | Lys | Cys | Asp | Glu | Leu | Ala | Ala | Lys | Leu | Val | Ala | | |
| | | 370 | | | | 375 | | | | | | 380 | | | | | |
| Leu | Gly | Val | Asn | Ala | Val | Ala | Tyr | Tyr | Arg | Gly | Leu | Asp | Val | Ser | Val | | |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 | | |
| Ile | Pro | Thr | Ser | Gly | Asp | Val | Val | Val | Val | Ala | Thr | Asp | Ala | Leu | Met | | |
| | | | | 405 | | | | | 410 | | | | | | 415 | | |
| Thr | Gly | Phe | Thr | Gly | Asp | Phe | Asp | Ser | Val | Ile | Asp | Cys | Asn | Thr | Cys | | |
| | | | 420 | | | | | 425 | | | | | 430 | | | | |
| Val | Thr | Gln | Thr | Val | Asp | Phe | Ser | Leu | Asp | Pro | Thr | Phe | Thr | Ile | Glu | | |
| | | 435 | | | | | 440 | | | | | 445 | | | | | |
| Thr | Ile | Thr | Leu | Pro | Gln | Asp | Ala | Val | Ser | Arg | Thr | Gln | Arg | Arg | Gly | | |
| | | 450 | | | | 455 | | | | | 460 | | | | | | |
| Arg | Thr | Gly | Arg | Gly | Lys | Pro | Gly | Ile | Tyr | Arg | Phe | Val | Ala | Pro | Gly | | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | | |
| Glu | Arg | Pro | Ser | Gly | Met | Phe | Asp | Ser | Ser | Val | Leu | Cys | Glu | Cys | Tyr | | |
| | | | | 485 | | | | | 490 | | | | | | 495 | | |
| Asp | Ala | Gly | Cys | Ala | Trp | Tyr | Glu | Leu | Thr | Pro | Ala | Glu | Thr | Thr | Val | | |
| | | | 500 | | | | | 505 | | | | | 510 | | | | |
| Arg | Leu | Arg | Ala | Tyr | Met | Asn | Thr | Pro | Gly | Leu | Pro | Val | Cys | Gln | Asp | | |
| | | 515 | | | | | 520 | | | | | 525 | | | | | |
| His | Leu | Glu | Phe | Trp | Glu | Gly | Val | Phe | Thr | Gly | Leu | Thr | His | Ile | Asp | | |

100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525

| | | |
|---|-----|-----|
| 530 | 535 | 540 |
| Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Leu Pro Tyr | | |
| 545 | 550 | 555 |
| Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro | | |
| | 565 | 570 |
| Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr | | |
| | 580 | 585 |
| Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn | | |
| | 595 | 600 |
| Glu Val Thr Leu Thr His Pro Val Thr Lys Tyr Ile Met Thr Cys Met | | |
| | 610 | 615 |
| Ser Ala Asp Leu Glu Val Val Arg Pro Thr Trp Val Leu Val Gly Gly | | |
| 625 | 630 | 635 |
| Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val | | |
| | 645 | 650 |
| Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp | | |
| | 660 | 665 |
| Arg Glu Val Leu Tyr Arg Glu Phe Asp Glu Met Glu Glu Cys | | |
| | 675 | 680 |
| | | 685 |

<210> 45

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 45

| | | |
|---|-----|-----|
| Met Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu Gly | | |
| 1 | 5 | 10 |
| Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu Gly | | |
| | 20 | 25 |
| Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys | | |
| | 35 | 40 |
| Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr | | |
| | 50 | 55 |
| Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp | | |
| 65 | 70 | 75 |
| Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr | | |
| | 85 | 90 |
| Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala | | |
| | 100 | 105 |
| Asp Val Ile Pro Val Arg Arg Arg Gly Asp Gly Arg Gly Ser Leu Leu | | |
| | 115 | 120 |
| Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu | | |
| | 130 | 135 |
| Leu Cys Pro Ala Gly His Ala Val Gly Ile Phe Arg Ala Ala Val Cys | | |
| 145 | 150 | 155 |
| Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser Leu | | |
| | 165 | 170 |
| Glu Thr Thr Met Arg Ser Pro Val Phe Ser Asp Asn Ser Ser Pro Pro | | |
| | 180 | 185 |
| Ala Val Pro Gln Ser Tyr Gln Val Ala His Leu His Ala Pro Thr Gly | | |
| | | 190 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Leu | Ala | Ala | Leu | Ala | Ala | Tyr | Cys | Leu | Ser | Thr | Gly | Cys | Val | Val |
| | | | | 645 | | | | | 650 | | | | | 655 | |
| Ile | Val | Gly | Arg | Ile | Val | Leu | Ser | Gly | Lys | Pro | Ala | Ile | Ile | Pro | Asp |
| | | | 660 | | | | | 665 | | | | | 670 | | |
| Arg | Glu | Val | Leu | Tyr | Arg | Glu | Phe | Asp | Glu | Met | Glu | Glu | Cys | | |
| | | 675 | | | | | 680 | | | | | 685 | | | |

<210> 46
 <211> 686
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Mutant Hepatitis C virus NS3/4A

<400> 46

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Pro | Ile | Thr | Ala | Tyr | Ala | Gln | Gln | Thr | Arg | Gly | Leu | Leu | Gly |
| 1 | | | | 5 | | | | 10 | | | | | 15 | | |
| Cys | Ile | Ile | Thr | Ser | Leu | Thr | Gly | Arg | Asp | Lys | Asn | Gln | Val | Glu | Gly |
| | | | 20 | | | | 25 | | | | | 30 | | | |
| Glu | Val | Gln | Ile | Val | Ser | Thr | Ala | Ala | Gln | Thr | Phe | Leu | Ala | Thr | Cys |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Ile | Asn | Gly | Val | Cys | Trp | Thr | Val | Tyr | His | Gly | Ala | Gly | Thr | Arg | Thr |
| | 50 | | | | | 55 | | | | 60 | | | | | |
| Ile | Ala | Ser | Pro | Lys | Gly | Pro | Val | Ile | Gln | Met | Tyr | Thr | Asn | Val | Asp |
| 65 | | | | 70 | | | | | 75 | | | | | 80 | |
| Gln | Asp | Leu | Val | Gly | Trp | Pro | Ala | Pro | Gln | Gly | Ala | Arg | Ser | Leu | Thr |
| | | | | 85 | | | | 90 | | | | | 95 | | |
| Pro | Cys | Thr | Cys | Gly | Ser | Ser | Asp | Leu | Tyr | Leu | Val | Thr | Arg | His | Ala |
| | | | 100 | | | | 105 | | | | | 110 | | | |
| Asp | Val | Ile | Pro | Val | Arg | Arg | Arg | Gly | Asp | Gly | Arg | Gly | Ser | Leu | Leu |
| | | 115 | | | | 120 | | | | | 125 | | | | |
| Ser | Pro | Arg | Pro | Ile | Ser | Tyr | Leu | Lys | Gly | Ser | Ser | Gly | Gly | Pro | Leu |
| | 130 | | | | | 135 | | | | 140 | | | | | |
| Leu | Cys | Pro | Ala | Gly | His | Ala | Val | Gly | Ile | Phe | Arg | Ala | Ala | Val | Cys |
| 145 | | | | 150 | | | | | 155 | | | | | 160 | |
| Thr | Arg | Gly | Val | Ala | Lys | Ala | Val | Asp | Phe | Ile | Pro | Val | Glu | Ser | Leu |
| | | | | 165 | | | | 170 | | | | | 175 | | |
| Glu | Thr | Thr | Met | Arg | Ser | Pro | Val | Phe | Ser | Asp | Asn | Ser | Ser | Pro | Pro |
| | | | 180 | | | | | 185 | | | | 190 | | | |
| Ala | Val | Pro | Gln | Ser | Tyr | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | Gly |
| | | 195 | | | | 200 | | | | | 205 | | | | |
| Ser | Gly | Lys | Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Gln | Gly | Tyr |
| | 210 | | | | | 215 | | | | 220 | | | | | |
| Lys | Val | Leu | Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Met | Gly | Phe | Gly |
| 225 | | | | 230 | | | | | 235 | | | | | 240 | |
| Ala | Tyr | Met | Ser | Lys | Ala | His | Gly | Ile | Asp | Pro | Asn | Ile | Arg | Thr | Gly |
| | | | | 245 | | | | 250 | | | | | 255 | | |
| Val | Arg | Thr | Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | Gly |
| | | | 260 | | | | | 265 | | | | 270 | | | |
| Lys | Phe | Leu | Ala | Asp | Gly | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | Ile |
| | | 275 | | | | 280 | | | | | 285 | | | | |
| Ile | Cys | Asp | Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Leu | Gly | Ile |
| | 290 | | | | | 295 | | | | | 300 | | | | |

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Thr | Val | Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Thr | Val | 305 | 310 | 315 | 320 |
| Leu | Ala | Thr | Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Pro | His | Pro | Asn | 325 | 330 | 335 | |
| Ile | Glu | Glu | Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | Gly | 340 | 345 | 350 | |
| Lys | Ala | Ile | Pro | Leu | Glu | Ala | Ile | Lys | Gly | Gly | Arg | His | Leu | Ile | Phe | 355 | 360 | 365 | |
| Cys | His | Ser | Lys | Lys | Lys | Cys | Asp | Glu | Leu | Ala | Ala | Lys | Leu | Val | Ala | 370 | 375 | 380 | |
| Leu | Gly | Val | Asn | Ala | Val | Ala | Tyr | Tyr | Arg | Gly | Leu | Asp | Val | Ser | Val | 385 | 390 | 395 | 400 |
| Ile | Pro | Thr | Ser | Gly | Asp | Val | Val | Val | Val | Ala | Thr | Asp | Ala | Leu | Met | 405 | 410 | 415 | |
| Thr | Gly | Phe | Thr | Gly | Asp | Phe | Asp | Ser | Val | Ile | Asp | Cys | Asn | Thr | Cys | 420 | 425 | 430 | |
| Val | Thr | Gln | Thr | Val | Asp | Phe | Ser | Leu | Asp | Pro | Thr | Phe | Thr | Ile | Glu | 435 | 440 | 445 | |
| Thr | Ile | Thr | Leu | Pro | Gln | Asp | Ala | Val | Ser | Arg | Thr | Gln | Arg | Arg | Gly | 450 | 455 | 460 | |
| Arg | Thr | Gly | Arg | Gly | Lys | Pro | Gly | Ile | Tyr | Arg | Phe | Val | Ala | Pro | Gly | 465 | 470 | 475 | 480 |
| Glu | Arg | Pro | Ser | Gly | Met | Phe | Asp | Ser | Ser | Val | Leu | Cys | Glu | Cys | Tyr | 485 | 490 | 495 | |
| Asp | Ala | Gly | Cys | Ala | Trp | Tyr | Glu | Leu | Thr | Pro | Ala | Glu | Thr | Thr | Val | 500 | 505 | 510 | |
| Arg | Leu | Arg | Ala | Tyr | Met | Asn | Thr | Pro | Gly | Leu | Pro | Val | Cys | Gln | Asp | 515 | 520 | 525 | |
| His | Leu | Glu | Phe | Trp | Glu | Gly | Val | Phe | Thr | Gly | Leu | Thr | His | Ile | Asp | 530 | 535 | 540 | |
| Ala | His | Phe | Leu | Ser | Gln | Thr | Lys | Gln | Ser | Gly | Glu | Asn | Leu | Pro | Tyr | 545 | 550 | 555 | 560 |
| Leu | Val | Ala | Tyr | Gln | Ala | Thr | Val | Cys | Ala | Arg | Ala | Gln | Ala | Pro | Pro | 565 | 570 | 575 | |
| Pro | Ser | Trp | Asp | Gln | Met | Trp | Lys | Cys | Leu | Ile | Arg | Leu | Lys | Pro | Thr | 580 | 585 | 590 | |
| Leu | His | Gly | Pro | Thr | Pro | Leu | Leu | Tyr | Arg | Leu | Gly | Ala | Val | Gln | Asn | 595 | 600 | 605 | |
| Glu | Val | Thr | Leu | Thr | His | Pro | Val | Thr | Lys | Tyr | Ile | Met | Thr | Cys | Met | 610 | 615 | 620 | |
| Ser | Ala | Asp | Leu | Glu | Val | Val | Cys | Ser | Thr | Trp | Val | Leu | Val | Gly | Gly | 625 | 630 | 635 | 640 |
| Val | Leu | Ala | Ala | Leu | Ala | Ala | Tyr | Cys | Leu | Ser | Thr | Gly | Cys | Val | Val | 645 | 650 | 655 | |
| Ile | Val | Gly | Arg | Ile | Val | Leu | Ser | Gly | Lys | Pro | Ala | Ile | Ile | Pro | Asp | 660 | 665 | 670 | |
| Arg | Glu | Val | Leu | Tyr | Arg | Glu | Phe | Asp | Glu | Met | Glu | Glu | Cys | | | 675 | 680 | 685 | |

<210> 47

<211> 686

<212> PRT

<213> Artificial Sequence

<223> Mutant Hepatitis C virus NS3/4A

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Pro | Ile | Thr | Ala | Tyr | Ala | Gln | Gln | Thr | Arg | Gly | Leu | Leu | Gly |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Cys | Ile | Ile | Thr | Ser | Leu | Thr | Gly | Arg | Asp | Lys | Asn | Gln | Val | Glu | Gly |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Glu | Val | Gln | Ile | Val | Ser | Thr | Ala | Ala | Gln | Thr | Phe | Leu | Ala | Thr | Cys |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Ile | Asn | Gly | Val | Cys | Trp | Thr | Val | Tyr | His | Gly | Ala | Gly | Thr | Arg | Thr |
| | 50 | | | | | 55 | | | | 60 | | | | | |
| Ile | Ala | Ser | Pro | Lys | Gly | Pro | Val | Ile | Gln | Met | Tyr | Thr | Asn | Val | Asp |
| 65 | | | | 70 | | | | | | 75 | | | | | 80 |
| Gln | Asp | Leu | Val | Gly | Trp | Pro | Ala | Pro | Gln | Gly | Ala | Arg | Ser | Leu | Thr |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Pro | Cys | Thr | Cys | Gly | Ser | Ser | Asp | Leu | Tyr | Leu | Val | Thr | Arg | His | Ala |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Asp | Val | Ile | Pro | Val | Arg | Arg | Arg | Gly | Asp | Gly | Arg | Gly | Ser | Leu | Leu |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ser | Pro | Arg | Pro | Ile | Ser | Tyr | Leu | Lys | Gly | Ser | Ser | Gly | Gly | Pro | Leu |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Leu | Cys | Pro | Ala | Gly | His | Ala | Val | Gly | Ile | Phe | Arg | Ala | Ala | Val | Cys |
| 145 | | | | 150 | | | | | | 155 | | | | | 160 |
| Thr | Arg | Gly | Val | Ala | Lys | Ala | Val | Asp | Phe | Ile | Pro | Val | Glu | Ser | Leu |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Glu | Thr | Thr | Met | Arg | Ser | Pro | Val | Phe | Ser | Asp | Asn | Ser | Ser | Pro | Pro |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Ala | Val | Pro | Gln | Ser | Tyr | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | Gly |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Ser | Gly | Lys | Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Gln | Gly | Tyr |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Lys | Val | Leu | Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Met | Gly | Phe | Gly |
| 225 | | | | 230 | | | | | | 235 | | | | | 240 |
| Ala | Tyr | Met | Ser | Lys | Ala | His | Gly | Ile | Asp | Pro | Asn | Ile | Arg | Thr | Gly |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Val | Arg | Thr | Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | Gly |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Lys | Phe | Leu | Ala | Asp | Gly | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | Ile |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Ile | Cys | Asp | Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Leu | Gly | Ile |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Gly | Thr | Val | Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Thr | Val |
| 305 | | | | 310 | | | | | | 315 | | | | | 320 |
| Leu | Ala | Thr | Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Pro | His | Pro | Asn |
| | | | | 325 | | | | | 330 | | | | | 335 | |
| Ile | Glu | Glu | Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | Gly |
| | | | 340 | | | | | | 345 | | | | 350 | | |
| Lys | Ala | Ile | Pro | Leu | Glu | Ala | Ile | | | | | | | | |

Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln Asp
 515 520 525
 His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile Asp
 530 535 540
 Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Leu Pro Tyr
 545 550 555 560
 Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro
 565 570 575
 Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr
 580 585 590
 Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn
 595 600 605
 Glu Val Thr Leu Thr His Pro Val Thr Lys Tyr Ile Met Thr Cys Met
 610 615 620
 Ser Ala Asp Leu Glu Val Ser Ser Ser Thr Trp Val Leu Val Gly Gly
 625 630 635 640
 Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val
 645 650 655
 Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp
 660 665 670
 Arg Glu Val Leu Tyr Arg Glu Phe Asp Glu Met Glu Glu Cys
 675 680 685

<210> 49

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 49

Met Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu Gly
 1 5 10 15
 Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu Gly
 20 25 30
 Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys
 35 40 45
 Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr
 50 55 60
 Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp
 65 70 75 80
 Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr
 85 90 95
 Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala
 100 105 110
 Asp Val Ile Pro Val Arg Arg Arg Gly Asp Gly Arg Gly Ser Leu Leu
 115 120 125
 Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu
 130 135 140
 Leu Cys Pro Ala Gly His Ala Val Gly Ile Phe Arg Ala Ala Val Cys
 145 150 155 160
 Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser Leu
 165 170 175

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Glu | Thr | Thr | Met | Arg | Ser | Pro | Val | Phe | Ser | Asp | Asn | Ser | Ser | Pro | Pro | | |
| | | | 180 | | | | | 185 | | | | | 190 | | | | |
| Ala | Val | Pro | Gln | Ser | Tyr | Gln | Val | Ala | His | Leu | His | Ala | Pro | Thr | Gly | | |
| | | 195 | | | | | 200 | | | | | 205 | | | | | |
| Ser | Gly | Lys | Ser | Thr | Lys | Val | Pro | Ala | Ala | Tyr | Ala | Ala | Gln | Gly | Tyr | | |
| | 210 | | | | | 215 | | | | | 220 | | | | | | |
| Lys | Val | Leu | Val | Leu | Asn | Pro | Ser | Val | Ala | Ala | Thr | Met | Gly | Phe | Gly | | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | | |
| Ala | Tyr | Met | Ser | Lys | Ala | His | Gly | Ile | Asp | Pro | Asn | Ile | Arg | Thr | Gly | | |
| | | | 245 | | | | | | 250 | | | | | 255 | | | |
| Val | Arg | Thr | Ile | Thr | Thr | Gly | Ser | Pro | Ile | Thr | Tyr | Ser | Thr | Tyr | Gly | | |
| | | | 260 | | | | | 265 | | | | | 270 | | | | |
| Lys | Phe | Leu | Ala | Asp | Gly | Gly | Cys | Ser | Gly | Gly | Ala | Tyr | Asp | Ile | Ile | | |
| | | 275 | | | | | 280 | | | | | 285 | | | | | |
| Ile | Cys | Asp | Glu | Cys | His | Ser | Thr | Asp | Ala | Thr | Ser | Ile | Leu | Gly | Ile | | |
| | 290 | | | | | 295 | | | | | 300 | | | | | | |
| Gly | Thr | Val | Leu | Asp | Gln | Ala | Glu | Thr | Ala | Gly | Ala | Arg | Leu | Thr | Val | | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | | |
| Leu | Ala | Thr | Ala | Thr | Pro | Pro | Gly | Ser | Val | Thr | Val | Pro | His | Pro | Asn | | |
| | | | | 325 | | | | | 330 | | | | | 335 | | | |
| Ile | Glu | Glu | Val | Ala | Leu | Ser | Thr | Thr | Gly | Glu | Ile | Pro | Phe | Tyr | Gly | | |
| | | | 340 | | | | | 345 | | | | | 350 | | | | |
| Lys | Ala | Ile | Pro | Leu | Glu | Ala | Ile | Lys | Gly | Gly | Arg | His | Leu | Ile | Phe | | |
| | | 355 | | | | | 360 | | | | | 365 | | | | | |
| Cys | His | Ser | Lys | Lys | Lys | Cys | Asp | Glu | Leu | Ala | Ala | Lys | Leu | Val | Ala | | |
| | 370 | | | | | 375 | | | | | 380 | | | | | | |
| Leu | Gly | Val | Asn | Ala | Val | Ala | Tyr | Tyr | Arg | Gly | Leu | Asp | Val | Ser | Val | | |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 | | |
| Ile | Pro | Thr | Ser | Gly | Asp | Val | Val | Val | Val | Ala | Thr | Asp | Ala | Leu | Met | | |
| | | | 405 | | | | | 410 | | | | | | 415 | | | |
| Thr | Gly | Phe | Thr | Gly | Asp | Phe | Asp | Ser | Val | Ile | Asp | Cys | Asn | Thr | Cys | | |
| | | | 420 | | | | 425 | | | | | | 430 | | | | |
| Val | Thr | Gln | Thr | Val | Asp | Phe | Ser | Leu | Asp | Pro | Thr | Phe | Thr | Ile | Glu | | |
| | | 435 | | | | | 440 | | | | | 445 | | | | | |
| Thr | Ile | Thr | Leu | Pro | Gln | Asp | Ala | Val | Ser | Arg | Thr | Gln | Arg | Arg | Gly | | |
| | 450 | | | | | 455 | | | | | 460 | | | | | | |
| Arg | Thr | Gly | Arg | Gly | Lys | Pro | Gly | Ile | Tyr | Arg | Phe | Val | Ala | Pro | Gly | | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | | |
| Glu | Arg | Pro | Ser | Gly | Met | Phe | Asp | Ser | Ser | Val | Leu | Cys | Glu | Cys | Tyr | | |
| | | | | 485 | | | | | 490 | | | | | 495 | | | |
| Asp | Ala | Gly | Cys | Ala | Trp | Tyr | Glu | Leu | Thr | Pro | Ala | Glu | Thr | Thr | Val | | |
| | | | 500 | | | | | 505 | | | | | 510 | | | | |
| Arg | Leu | Arg | Ala | Tyr | Met | Asn | Thr | Pro | Gly | Leu | Pro | Val | Cys | Gln | Asp | | |
| | | 515 | | | | | 520 | | | | | 525 | | | | | |
| His | Leu | Glu | Phe | Trp | Glu | Gly | Val | Phe | Thr | Gly | Leu | Thr | His | Ile | Asp | | |
| | 530 | | | | | 535 | | | | | 540 | | | | | | |
| Ala | His | Phe | Leu | Ser | Gln | Thr | Lys | Gln | Ser | Gly | Glu | Asn | Leu | Pro | Tyr | | |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 | | |
| Leu | Val | Ala | Tyr | Gln | Ala | Thr | Val | Cys | Ala | Arg | Ala | Gln | Ala | Pro | Pro | | |
| | | | | 565 | | | | | 570 | | | | | 575 | | | |
| Pro | Ser | Trp | Asp | Gln | Met | Trp | Lys | Cys | Leu | Ile | Arg | Leu | Lys | Pro | Thr | | |
| | | | 580 | | | | | 585 | | | | | 590 | | | | |
| Leu | His | Gly | Pro | Thr | Pro | Leu | Leu | Tyr | Arg | Leu | Gly | Ala | Val | Gln | Asn | | |
| | | 595 | | | | | 600 | | | | | 605 | | | | | |
| Glu | Val | Thr | Leu | Thr | His | Pro | Val | Thr | Lys | Tyr | Ile | Met | Thr | Cys | Met | | |

[illegible]